PC PILOT

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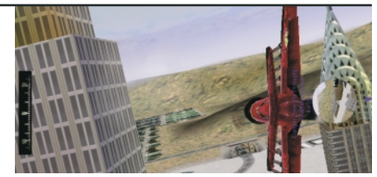

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We've got a whole air force of Maximum Flight compendiums to give away, courtesy of Empire Interactive

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Editor's Letter

Cheer up - it's nearly Christmas

The festive season is still a fair way off, but it always has a habit of creeping up on you. Make sure you leave all those back issues of PC Pilot carefully spread open around the house, so that your nearest and dearest know what you want from Santa. Of course, Christmas isn't all fun and joy and we should spare a thought for those less fortunate than ourselves who will be having a miserable time while everyone else is in party mood. We're referring of course, to one or two odd individuals who would prefer you to download at cost rather than open up for nothing. The vast majority of freeware developers are happy for you to get access to their products through our free cover CDs. However, there are a couple who believe it's not free unless it's downloaded. Condemned to a life of misery, this sad minority live in a constant state of anger at the rest of the world and the fear of copyright theft hangs over them like the Sword of Damocles.

We first came across these poor folk when we started asking for permission to put some examples of freeware that we liked on a cover CD, back in Issue 6. This was a cover CD on a magazine, remember, not to go in a box with a manual and sell for £24.99 from the huge commercial hypermarket we run in our spare time. However, to say the reaction from some quarters took us by surprise is an understatement. First, we got some polite negatives, then we got some blunt no's and finally we started getting rude answers. We even saw an edict to 'all magazines' posted on a website about 'freeware on magazine CDs'. As the only magazine for flight simulation that includes cover CDs, we took that one rather personally!

At this point we looked in our post bag and counted the hundreds of mails you regularly send us asking for more freeware on the CD. The answer is we'd love to include all your requests, but there are a few developers out there who do some nice enhancements, but they don't want them on a CD. Far better you make a two-hour telephone call and obtain their offerings at a cost. You haven't got Internet access? Well, then you haven't got their freeware, so there! We must admit to being perplexed. The (thankfully few) incidents of a commercial publisher stealing freeware occurred before PC Pilot arrived on the scene, so what's the reason? The famous robber baron is more likely to obtain freeware from the Internet than he is to pay for PC Pilot and then copy it from our CD.

We can't fathom it out. Suffice it to say that freeware is only free if your phone is free and we only wanted to help our readers. As PC Pilot is now so popular among flight simmers, helping our readers (we thought, smugly) is helping the whole community.

Anyway, we'd just like to say many thanks to all the freeware developers who said 'yes' and have been included on our previous CDs. A special thank you and a Happy Christmas goes out to everyone with freeware on the CD with this issue, who all volunteered their products.

But finally, as you tuck into your dinner on Christmas day, spare a thought for the dwindling ranks of those who don't want their freeware available to all. Just for a moment put down that turkey leg, pick up the phone, dial the speaking clock on another continent and leave your phone off the hook for three hours. Somewhere out there, a lonely developer will be heating up pennies in the gas stove to throw to carol singers and your sacrifice to the phone company will make his yuletide 2000 a happy one. You never know, he might even smile.

Good luck, Happy Christmas and thank you for flying with us into the New Year!

Dermot Stapleton
derm@pcpilot.net

COMMS

FS Commander

FROM: Eytan Ornstein

While your review of FS Commander in Issue 7 was mostly positive, you found that the ATC feature wouldn't work. Did you try contacting FSC author Sascha Felix about this problem? He could have easily resolved the issue. I know he was very helpful to me when I e-mailed him regarding some problems in FSC. The ATC in FSC is one way mostly, i.e. pressing the ATC button on the little GPS window will prompt the controller (ground, tower centre or approach etc.) to give you directions such as "fly runway heading and climb to 4000ft". The ATC works only if you have created a flight plan, and then, in the map window, you activate both the ATC 'regular' option, and the GPS 'local'. In any case, Flight Simulator 2000 should already be running (and minimised) while FSC is being used to generate the flight plan. It's all there in Felix's manual. With so many competitors out there FSC can appear to be incomplete if its ATC feature is not explored. FSC is not Radar Contact. It doesn't aspire to be primarily an ATC product. But if you want a top notch flight planner with basic but adequate ATC, it's a formidable product.

We reply:

Happy to clear this one up Eytan. We certainly couldn't fathom out how to get the ATC working – we even read the manual when all else failed. Anyway, we liked FS Commander overall and we're pleased to pass on the experience of an obviously happy customer.

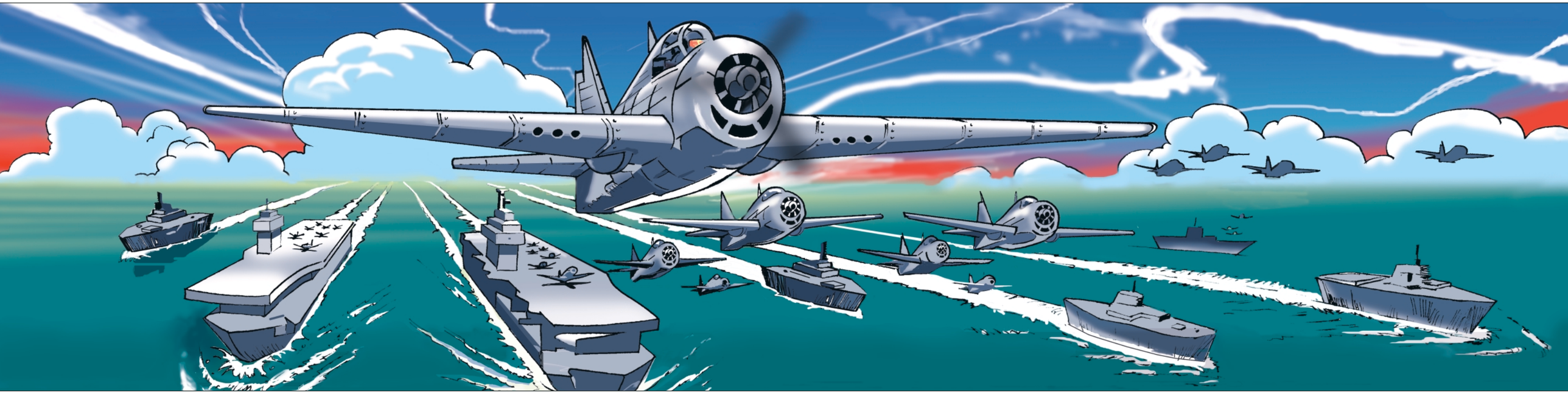
Did you clock the mistake?

FROM: Ted Rexter-Baker

Congratulations on a great publication, its just a bit above me, but has enough information to get me there! However, I must add my bit to the many letters you should have received regarding the gaff in 'checking the met' in the flight-planning feature, page 54 of Issue 7. Wind direction clockwise round a low? Stand with your back to the wind, and the low is on your left is a good way to remember that the direction is anti-clockwise. Or just watch the TV weather forecasts!

We reply:

Well spotted Ted. However, yours was the only mail we got about this one. Watch out for others in a similar vein such as: 'pull the stick back and descend to 2,000 ft' or 'the Trident rose majestically into the air, all four engines pulling hard…' Actually, we suspect the wind direction mistake was down to a bit of typing confusion along the lines of 'clockwise from an anti cyclone, etc.' The culprit will be spending a day in the RAE wind tunnel to prevent any similar occurrences.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THE CREW

EDITORIAL

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SUBMISSIONS

We will gladly accept and review for publication any letters, articles, photographs or other contributions. We cannot guarantee publication nor, regrettably, return items sent to us or be responsible for their loss. We will try and reply where possible. Any letters are assumed suitable for publication unless we are otherwise notified.

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Help!

FROM: Darren Clark

I need your help. I'm after a British Midland B737-300-400 etc. for Fight Simulator 2000 Pro. I've searched high and low and can't find a decent one. Please could you help me? Also, is there an Airtours virtual airline?

We reply:

Can anyone out there help Darren in his quest? Drop us a line at mail@pcpilot.net and we'll pass on any information.

Pile 'em high, sell 'em cheap!

FROM: Robert Bruner

Lou Betti (Opinion – last issue) states that he "gets a kick out of those who say a high quality twenty pound add-on is expensive" and that if we "knew just what goes into a panel, aircraft, and sound package, we would consider twenty pounds to be a steal, it should be five times that!" He then goes on to compare the cost of purchasing panel add-ons to the cost of renting an actual airplane for an hour.

I believe a much more realistic comparison would be the cost of an add-on versus the cost of the flight simulator itself. I can go into any store in Chicago and purchase Fly2K for $39.95. This includes the actual simulator engine, worldwide scenery, printed manuals, CDs and all five of the original aircraft — complete with sound packages and award-winning panels. By comparison I can purchase a 737 add on for Fly! with no CD, and online documentation for $29.95. When looked at from that perspective, the add-on, at ⅔ the cost of the simulator, seems extremely expensive.

"Five times that amount?" Mr. Betti, I think not. When it comes to spending my own hard earned money, the only consideration must be how a product compares in price and quality to competitive products and not what others went through to make it, as I assume they all went through similar activity. Supply and demand will determine the product's final value.

With that said, I think it's worth mentioning that over the years I've purchased several add-ons, so I'm not opposed to spending money when I feel value dictates it. I do however think that my definition of value better represents the opinions held by the majority of those in the flight simulation community than those presented of Mr. Betti.

We reply:

Lou's forthright opinion prompted lots of mail, mostly in agreement. However, Robert was a dissenting voice and we thought it fair to point out that Fly!2K costs a lot more than $39.95 in the UK and FS2000 Pro is over $100 (or £70 in English money). Still, Robert makes a valid point nonetheless, although the sales of standalone sims normally exceed those of add-ons by a factor of 10 (or 100 in the case of Flight Simulator). This makes it a numbers game – if Abacus could sell a million copies of Tuskegee Fighters, or Just Flight moved the same number of Luftwaffe Collection, they might be a bit cheaper! For the perspective from the developer of an actual sim, enjoy the latest Opinion column in this issue from Austin Meyer, the man behind X-Plane.

Not so mad about Mad Dog

FROM: Dag Beskow

I am a subscriber of PC Pilot and am very content with this excellent paper! I recently read your article about Mad Dog 2000. I got very interested in this add on for FS2000 and so I bought the program here in Gothenburg and installed it on my computer (Intel PIII 450, Geforce 256). To my surprise there are several bugs in the program. I get problems with: speed brakes impossible to retract after extension, impossible to get 'VSpeed 2000 Datasheet - Takeoff,' after performing a push back it's impossible to use both engines, the throttle is only working on one engine and therefore it's impossible to continue moving the aircraft, taxi or take off.

In your article there are no comments on any bugs! To test the program I have installed it on another computer with exactly the same hardware, but exactly the same bugs appeared! I have sent an e-mail to Lago about my problems, but haven't got an answer. I would appreciate very much your comments on my problems!

Stephen Heyworth replies:

Dag Beskow raises three points about Mad Dog 2000:

(1) It is impossible to handle both engines at once. To control both engines at once, press the keys E, 1, 2 in rapid succession. This is a standard, if rarely used, control for Flight Simulator. Press E then 1 to select engine 1, etc. To select both requires E then 1 and then 2. I assume that Lago start with one engine selected to allow individual control during the start-ups, which would be normal. Yes, it is impossible to take off on only one engine!

(2) VSpeeds Datasheet. Clicking on the instrument panel does not work, however the datasheets are easily shown by pressing Shift and 3 simultaneously. Again this is a standard Flight Simulator command for extra bits of the panel. To switch between landing and takeoff sheets (which I think is the real concern) click on the top right corner of the datasheet. Some of the text is not easily legible, so an alternative is to set the bugs on the ASI (Air Speed Indicator), which can be set to the appropriate points by clicking on the green oblong indicator above the ASI, this sets them to Takeoff and Land in turn. Details of their meanings are in the manual.

(3) Retracting Spoilers. The spoilers can be deployed by clicking on the instrument panel, however they can only be retracted by pressing the / (slash or divide) key next to the right hand shift key.

I hope this helps Dag get airborne and enjoy the software.

NEWS

Big Bear III LAN meet

Big Bear is the largest local area network (LAN) meet in Europe, organised by members of the Royal Netherlands Virtual Air Force. The event allowed the flight simulation community to come together at a single location for three days of coordinated flying on a high speed LAN. This year's Big Bear took place at the end of October, with entrants flying Flanker 2.0 from Mindscape, Falcon 4.0 from Microprose, and Enemy Engaged from Empire.

The event was sponsored by Mindscape, the company who produced Flanker 2.0 and Jim Mackonochie, the 'Father of Flanker', was also there. Held at the Grote Beer (Big Bear) in Apeldoorn, Holland, we hear that this year's event was a similar success to last year.

For the full lowdown and more information on the RNVAF, have a look at www.xs4all.nl ■

Everything louder than everything else

We had an excellent response to the competition in Issue 7 for those rather good Altec speakers. Many thanks and good luck to all of you who wrote in or e-mailed us. The competition closed as the ink was drying on this issue and the lucky winners will get to see their names in print in the next copy of PC Pilot. However, thanks to the wonders of modern technology (our man Gary and his trusty wheelbarrow) they should be able to annoy their neighbours with the new speakers well before Christmas, which will also come as a relief to the poor unfortunates in the rest of our building, who are convinced that PC Pilot tests aero engines from a fourth floor office!

For a chance to win some free software, there's another competition on page 9 of this issue. ■

Gripping stuff

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Competitive spirit

Flight simulation enthusiasts who fancy adding a competitive edge to their hobby, not to mention a few prizes to their collection, should check out a new site www.fscontests.com. Executive Director Hussain Bengali told us that he has already launched a screenshot competition. Keep an eye out for a freeware development competition next year with PC Pilot sponsorship. ■

Seattle Museum of Flight

PC Pilot reader Bert Fletcher, recently reminded us that Number One Microsoft Way isn't the only building in Seattle that might be of interest to flight simmers. If you're popping round for tea with Bill, the Museum of Flight will keep you occupied while you wait for an audience. Among many fascinating exhibits, they've got the Airforce One Boeing that carried Presidents Eisenhower, Kennedy and Nixon. More details at www.museumofflight.org ■

Free site, free access, what more do you want?

FlightSims.co.uk tell us that they have now launched a new website network. It will offer 10Mb of free website space that will be banner and advert free and at absolutely no cost. They are also launching a new online store, FlightSimMarket.com. This will be a large, easy to use, site offering flight simulation products at very low prices all over the world. To find out more, pay a visit to www.flightsims.co.uk and www.flightsimmarket.com. ■

An Irish club that's not a shillelagh

We recently discovered that the PC Pilot's Club of Ireland has now got members on every continent except Antarctica (but they're working on that one as well!). Two friends, Terry McGee and Ian Broni started their virtual flying with Flight Simulator 4 and Airline Transport Pilot. Once a week they would (and still do) meet in Ian's house and fly into the early hours. Terry and Ian always wanted to share their interest with other enthusiasts, so one evening in October 1993, during their weekly get together, they decided to form The PC Pilots Club of Ireland, which

would be dedicated to civil flight simulators.

The club made its debut at an Aviation Fair, where they demonstrated flight simulation and recruited their first official members. To date the club has members spread throughout the world.

The club publishes a quarterly magazine 'PC Flight', which contains many aticles contributed by club members. On the social side, the club has an annual 'Fly-In' (get together) where the members get the opportunity to meet each other and bring along their PCs for a days flying. For more information on becoming a virtual Irish flyer, drop them a mail at tmcg@iol.ie or have a look at their website, which can be found at www.pcpilotsireland.com ■

Boeing charts the future of their latest acquisition

The Boeing Company recently concluded its purchase of Jeppesen Sanderson Inc., after receiving approval from government authorities in the USA and Germany. Jeppesen becomes a wholly owned subsidiary of Boeing, reporting to the Commercial Aviation Services business unit of Boeing Commercial Airplanes Group (BCAG), and will continue to support the aviation industry (and flight simulation) as a stand-alone business.

"If you're a pilot almost anywhere in the world, you know Jeppesen," said John Hayhurst, vice president of business development for Commercial Aviation Services. "Jeppesen is the world's Number 1 source for flight information services, and that makes it a perfect fit for our growing aviation services portfolio."

Jeppesen employs 1,400 people at its headquarters in Denver and at other offices in Germany, Australia, China, the UK and other USA locations.

"We are delighted to be a part of The Boeing Company," said Horst Bergmann, CEO of Jeppesen. ■

Get real!

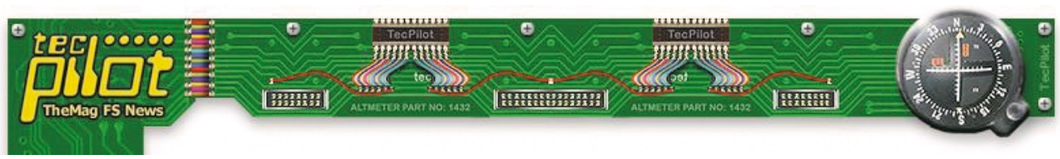
Just Flight are currently working on a new addition to their stable of add-ons for Flight Simulator 2000. Real Airports will aim to reproduce as accurately as possible the airport scenery for London Gatwick, Houston George Bush Intercontinental, Zurich Kloten, Rio de Janeiro Galeao,

Milan Malpensa, Cologne/Bonn Konrad Adenauer and Paris Orly.

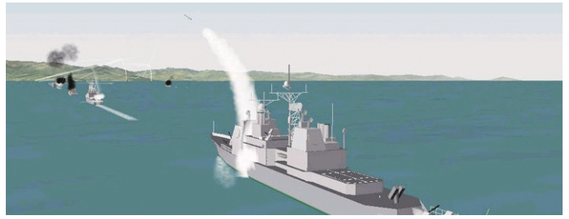
As a bonus Real airports will also include six full ATC guided adventures that feature a unique 'video view' from outside the aircraft as the crew run through pre flight checks. Each adventure will have full custom voices from several countries. The adventures are designed to be challenging to fly yet at the same time not over-complex in operation. There will also be six Airbus variants included, complete with panels, gauges and sounds a full manual with SID's, STAR's and histories of the various airports. Release is planned for early next year. Keep an eye on www.justflight.com for more details. ■

Technically speaking

Mike Clark, our very own consultant editor and the man behind The Mag FS News, has announced that he will soon be setting up a one stop resource for serious flight simmers who have one objective when jumping into a virtual cockpit - realism! The new service, www.tecpilot.com will be launched next spring. The members web site will include very detailed databases of technical information, forums, a discount shop for members and lots more useful stuff, including The Good Flight Simmers Guide, which Mike describes as "a bible for any virtual pilot". For more information please contact Mike Clark at mike@themag-fs-news.com. ■



Flanker 2.5 and Flanker Attack



In 1999 SSI released their long awaited sequel to Su27 1.5, Flanker 2.0. This high fidelity simulation of the naval version of the Russian Flanker finally brought the popular product into the modern graphical world, even adding clouds and weather.

Flanker 2.0 has some of the best looking aircraft models currently on a PC. It's also popular with online pilots and sports excellent weapons modelling. While also strong in flight model and avionics, the sim lacked something in gameplay. SSI promised to bring improvements, and has released a number of patches towards that end.

Earlier this year SSI announced an upgrade that will add numerous features and improve gameplay further. The list of features includes the ability to fly the MiG-29K (naval version), the ability to set waypoints for ships and ship to ship engagements, in flight refuelling, and an improved view system.

Furthermore, SSI has promised improved multiplayer chat, expanded wingman control, new scenarios and a new campaign. The addition of the naval version of the MiG-29 holds great promise and expanded ground attack missions promise to add new fun to the Flanker 2.0 world.

The inclusion of a new campaign was a necessity, given the limits of the earlier engine. Flanker 2.5 is currently in testing and we're told it should be available before Christmas (this year).

Finally, SSI has also announced their intention to release Flanker Attack. This will be an all-new simulation which will feature a new 3D engine and terrain system and will add the A-10 Warthog to the flyable aircraft in the Flanker world. ■

World Flight 2000 - Home!

In case you didn't see the report in our last issue and have missed all the excitement on the web, World Flight 2000 was successfully completed over the weekend of 4th November. A group of dedicated flight simmers, real pilots and a skilled back-up crew, flew around the world in a unique home-built 737 simulator. The object of this amazing feat was to raise money for the Children in Need charity. Organised by Daren Knightsbridge, this is the second year of the World Flight and early signs are that it will be even more successful than 1999. Despite a slight fuel problem at Lisbon, the World Flight team recovered from a six hour delay, to land a mere two hours behind schedule at Heathrow on Monday 6th. We doubt there's a real airline that could match this performance. PC Pilot has been helping out by processing donations to WF2000 through our web site www.pcpilot.net – you can donate in pounds, dollars, euros (roubles, cowrie shells…) via our secure credit card facility. All the latest news on World Flight 2000 can be found at www.world-flight.org and you'll find a link there to help you donate as well. Congratulations to all concerned from PC Pilot and we look forward to doing a feature on World Flight in a future issue.

COMPETITION

Maximise your chances to get Maximum Flight

If you saw the preview of Battle of Britain from Empire in our last issue, you'll know that it comes from a glorious heritage of great combat simulators, including MiG Alley and Flying Corps Gold. With every press report about Battle of Britain mentioning MiG Alley somewhere, Empire have capitalised on the extra coverage for their older thoroughbred and are re-releasing MiG Alley, together with F/A 18 Korea, Apache Havoc and Flying Corps Gold, all in a handy boxed set called Maximum Flight. If you've never tried any of Empire's combat offerings, or you want to complete your set, then this has definitely got your name on it. An ideal Christmas present for any flight sim enthusiast and a good value entry for any juniors that you think may need converting.

To save you queuing up in the deep and crisp and even (or if your local shops are flooded out) we've prised ten copies of this excellent collection out of Empire to give away to PC Pilot readers. To enter the competition, all you have to do is correctly answer the following questions:

1) MiG is short for:
   a) Moscow Industrial Giant
   b) Mikoyan Gurevich
   c) Machorka Isvestia Glasnost
2) The Sopwith Camel was so named because:
   a) It could fly for days without refuelling
   b) The fuselage in front of the cockpit forms a distinctive 'hump'
   c) Its designer was a heavy smoker of American cigarettes

The competition is open to PC Pilot readers from anywhere in the world with the exclusion of layout, editorial and administrative staff (and their friends, their wives, their wives' tennis partners, etc.).

You can send your answers by e-mail to comps@pcpilot.net or on a postcard/back of an envelope to:

Maximum Flight Competition
PC Pilot
PO Box 11
St Ives
PE27 3GW
United Kingdom

Please make sure you clearly state your full name, address and e-mail address (if you have one). The competition closes on 10th January. Entries received after that date cannot be included and prizes will be drawn at random from correct answers.

THE FREE CD-ROM

In response to popular demand… we've included yet another cover CD with some great stuff to save your phone bill from further suffering. There's a demo of Microsoft's latest 'leisure' offering, Crimson skies and you can see what we thought of the full version in our review elsewhere in this issue. If you'd like to try your hand at our latest competition to win a copy of Maximum Flight from Empire, you can feed your desire a bit further with a Mig Alley demo. Our latest freeware inclusion is from DreamFleet. If you don't have internet access, or a free phone line, then you'll see what you're missing with these excellent panels. We've also got a collection of useful patches, including all the ones from our previous CDs, the latest X-Plane update (that also works as a demo) as well as patches for Enemy Engaged and Falcon 4.0.

There's some great shareware from Gary Summons – all three parts of his amazing UK 2000 shareware scenery for Flight Simulator 2000, which we'll be reviewing in the next issue.

We've changed the CD front end a bit, to make it more user friendly, so it should 'autorun' to take you to each section. If it doesn't, go to 'My Computer' and double click on your CD drive icon. When it opens you'll see that there's a menu to take you to each section. Double click on the folders inside to open them up and see the rest of this page for detailed descriptions of everything inside.

CRIMSON SKIES DEMO

If you fancy a trip back to a fantasy 1930s, to fly some fantasy aircraft, then Crimson Skies is a must for you. We've reviewed Crimson Skies in this issue, but with this demo you can conduct your own appraisal and spend some time as Nathan Zachary, fighting the baddies.

GAME COMMANDER DEMO

Here's useful piece of software that we reviewed back in issue 5. You can control all your favourite programs by voice alone (well almost!).

MIG ALLEY DEMO

One of the most popular jet fighter programs of all time and re-released in the new Maximum Flight four-pack from Empire, we thought Mig Alley was worth another airing, so we've included a vintage (classic?) demo for anyone who hasn't seen it yet. If you like it, you could try your hand in our simple competition to win Mig Alley plus its other three stable mates. We've tested the demo on Windows 95 and 98 machines.

DEAMFLEET PANELS

As DreamFleet recently announced that their future products will all be published commercially, this could be your last chance to get panels of this quality for nothing. These really are free, as you've already bought PC Pilot, there's no phone call to make and if your PC crashes, you won't have to back them up or download them again, just keep the CD somewhere safe! We've included the panels for the Cessna 172, 182S and 182 RG. We hope you like them.

X-PLANE 5.42

We've got the latest mighty download for X-Plane – version 5.42 weighs in at a whopping 65Mb and we've also included a Mac version. If you've never tried X-Plane this update also works as a full demo, but it is only a demo, so please don't ask for product support – the stick is meant to freeze after five minutes!

GOZILLA

In order to download freeware that we can't put on our cover CDs, you'll wonder how you lived without this amazing piece of software. The free version includes adverts, but if you like it, you can always download GoZilla Plus. However, even with the free version, lost files with lost connections will become a thing of the past. Among its many properties, GoZilla allows you to download files in chunks, so you can stop and return where you left off. If a connection drops out, then GoZilla will save the download and you can carry on downloading whenever you like. It will also search for the fastest download site and even download updated files when they become available. To find out more about it, or purchase the full version, have a look at www.gozilla.com.

UK2000 Parts 1,2 & 3

If you are disappointed with the scenery of your own local airfield in Flight Simulator 98 or 2000, give yourself a treat with the three packs of UK2000 shareware scenery on our cover disc. One of our reviewers even found where he usually parks his car at his local airfield. Microsoft's terrain has improved a great deal, but do those programmers know what UK airfield's look like in detail? Well, Gary Summons lives in the UK and has used local aerial photographs to make these stunning UK airfields come alive.

PATCHES

To help with your phone bills we've included most of the patches from our previous CD's, for Fly!, FS2000, Flight Unlimited, Falcon 4.0 etc., as well as the latest 1.45 experimental patch for Enemy Engaged (you'll need 1.41, also on the CD)

ADDIT PRO

We included this handy shareware utility on an earlier CD, but here it is again in response to popular demand. AdditPro is an absolute wizard at sorting out files and popping them in the right folders. This should help reduce the confusion on your drives.

WINZIP 8.0

The latest version of the world's most useful utility. You'll need this installed before you can open any of the zip files on the CD. Please note that this is shareware and you should register and pay if you want to use it on a regular basis. ■

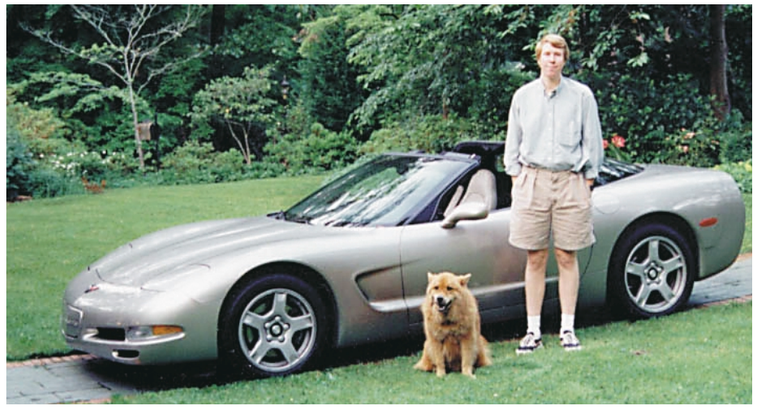
IMPORTANT - TECHNICAL SUPPORT

The CD and software on it, with the exception of shareware files, is free and as such, PC Pilot, Empire nor any of the publishers or developers of the software supplied on the CD can provide technical support. The software is supplied very much 'as is' and without support. Enjoy the CD and the software on it!

David and Goliath?

X-Plane

For the opinion column in this issue, we started out by considering the supposed lack of interest from large software publishers in flight simulators. Could it be that they're all frightened of taking on the giant from Seattle? The three standalone simulators (not counting combat programs) that seem to generate the most interest these days are Flight Simulator 2000, Fly! and X-Plane. The mighty Microsoft and the slightly less mighty Terminal Reality produce the first two, but what about the company behind X-Plane? You might be surprised to learn that Laminar Research, publishers of X-Plane, are pretty much driven by one man – Austin Meyer. We asked him this question: "Is it possible for a small company to develop a flight simulator and take on the might of Microsoft, and if so, what do you have to do differently?" His answers make very interesting reading, especially to any budding developers out there and also provide some useful lessons for budding dotcom millionaires.



Austin Meyer – the man behind X-Plane. As you can see he isn't a Buick customer

Is it possible to beat Microsoft in quality? The answer is yes! Any individual or small company can write a program and if the talent or knowledge are there, you can certainly beat Microsoft in terms of quality. Look at the Mac OS compared to Windows, or X-Plane compared to Flight Simulator - the answer is obvious.

Now for the next question: is it possible to beat Microsoft in sales? Unfortunately, the answer to that one is no. Microsoft will always sell more units because the general public does not know any better than to buy anything that has a Microsoft label on it. They're totally unaware of the higher quality (but less powerfully marketed and recognised) alternatives. Most people will thoughtlessly buy Microsoft every time for the same reason older people will buy a Buick almost every time, without a thought for any of the (superior) alternatives. They grew up with them and nobody changes those habits unless they're forced to.

...I have sold about 10,000 copies of X-Plane...

If you cannot beat Microsoft in sales, does that mean you go out of business if you compete with them? Again, the answer is no. I have sold about 10,000 copies of X-Plane, at an average price of around $129 each. Pull out a pencil and do the calculation... not too shabby for one person, especially as my costs are basically zero selling from my web page.

So, how do you run the business to make money in the Microsoft dominated world?

You try to make a better product.

You keep your costs down. Work out of your house, don't advertise except on your web page and count on word of mouth, coupled with best software quality, to bring the sales to your door.

With the best product and the lowest costs, even the small 'clued-in' percentage of the market place will be enough to run your business. The population of the earth is over six billion. There are enough sales to run a business with even a small slice of the consumer market if your costs are low. As soon as you start hiring people, renting offices, taking out adverts because your product is not good enough to spread through word-of-mouth (or good reviews), you are looking at the less rosy picture that many companies face until they go out of business. It all comes back to the quality of your product, which is exactly the way it should be.

Anyway I hope I have not made anybody too mad with my usual semi-flaming. To answer the question about what X-Plane does compared to its competitors, I can sum it up in three major points:

It has a much higher frame-rate.

It has a far more realistic flight model.

You'll find far less detailed buildings and landmarks (you win some you lose some), but I do let you try it first, and there's a demo available at www.x-plane.com, which is something you won't find with any other simulator out there! ■

Austin Meyer

Austin can be contacted by e-mail at Austin@x-plane.com

Jump Jet

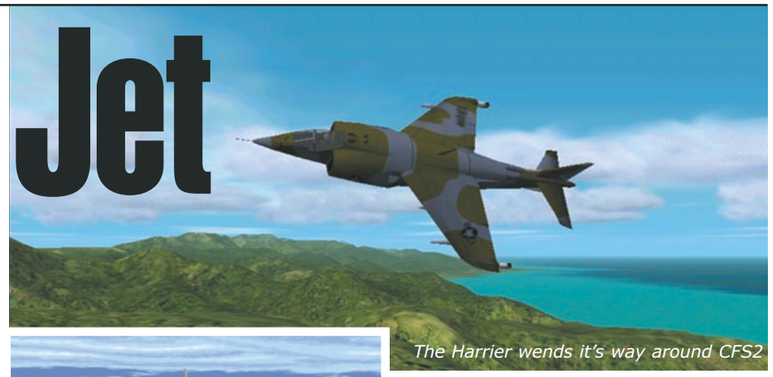
We have lift off!

What's this? A new add on for Combat Flight Simulator and Flight Simulator 2000 that hasn't got '2000' in the title and without an earlier version? What will they think of next? Aircraft that don't need runways, probably!

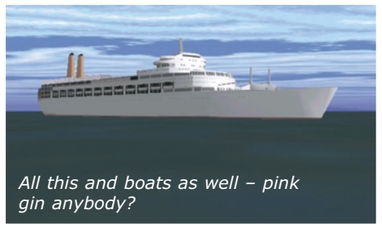
Jump Jet from Just Flight is an all-new add-on product being developed by Alpha Simulations, that will bring together 17 Harrier jump jets from all the nations currently using them. Designed primarily for Combat Flight Simulator (1 or 2), Jump Jet is a genuinely unique package that will feature a Falklands War scenario, complete with 20 missions where you can fly for the Argentine forces, Royal Navy or the RAF.

The Harrier models span the prototype P.1127 through to the latest Gr.7 and AV-8B+. Quality is impressive, with models fully animated, pilots in their seats, rotating 3D nozzles, and accurate panels for each type including additional aircraft such as the Argentinian Pucara. The flight model is realistic and carrier deck landings will present you with tough challenges.

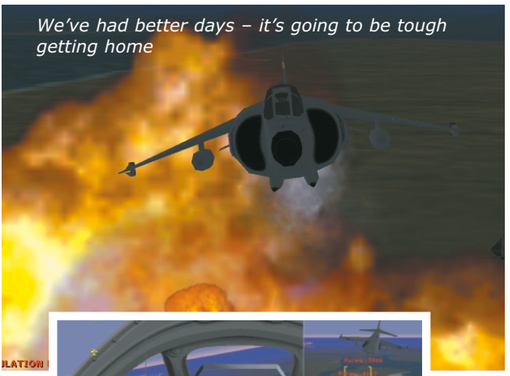
The Falklands War scenario models three Argentine aircraft as antagonists, including the A-4Q, Dagger and Pucara. You'll also see the Sea King helicopter and some highly detailed ships. Scenery is an improved elevated-mesh design, with four airfields, navaids and an authentic carrier group offshore. The Falklands War theme continues with detailed San Carlos Water scenery and a multitude of ships at anchor, including destroyers, frigates, landing support ships, HMS Fearless, SS Canberra and other requisitioned merchant vessels. Static scenery will include battle-damaged aircraft in various states of repair.



The Harrier wends it's way around CFS2



All this and boats as well – pink gin anybody?



We've had better days – it's going to be tough getting home

The Harrier cockpit – no jokes about "where does the lift attendant sit?" please

In the Combat Flight Simulator missions, the sky over San Carlos is filled with tracer fire and SAM missiles, which make for a fearsome experience. Half an hour of this frenetic action, flying a Sea King in an early version of the software, gave us a new respect for the Duke of York!

The missions can be accessed singly or via the Combat Flight Simulator Custom Campaign dialogue.

Early signs are that the action will be good, with all the features Combat Flight Simulator users are accustomed to, including the tactical map, additional windows, and the enemy indicator. Wingman chatter adds to the sense of immersion, although sometimes we wished for the ability to control them (but don't worry, they're working on that).

While the flight model feels authentic, energy retention with high G's seemed excessive in the early version. However, just like the real thing, the pilot has to work harder at speed management, or he'll easily overshoot his target. Authentic soundsets are included for the jets and the Sea King, with aircraft-specific ones in Flight Simulator 2000 for greater accuracy.

Wingmen seem more than willing to engage, but they won't be aces. They will help keep the bandits off your tail, compliment you on your combat ability and warn you of impending danger, which should certainly fulfil their job description and the voice acting is effective.

Mission flow within Jump Jet is well executed and the level of challenge seems to increase. It was novel to fly the Pucara, which is a twin turbo prop aircraft that is surprisingly agile, although it will be interesting to see how these fare against the Harriers when Jump Jet is released.

Alpha Simulations is hard at work on Combat Flight Simulator 2 compatibility, which will add a detailed weather model and wingman control, to assist your tactical ability. The beautiful weather effects of Combat Flight Simulator 2 should add atmosphere to the South Atlantic winter of 1982 and the soundsets will be the ones from Flight Simulator 2000.

Whether you fly in the original Combat Flight Simulator, it's newly released sequel, or just savour the thrill of getting airborne in the space of a billiard table rather than a football pitch, by piloting the Harriers in Flight Simulator 2000, Jump Jet should provide a good combination of novelty, fun and flying skill. ■

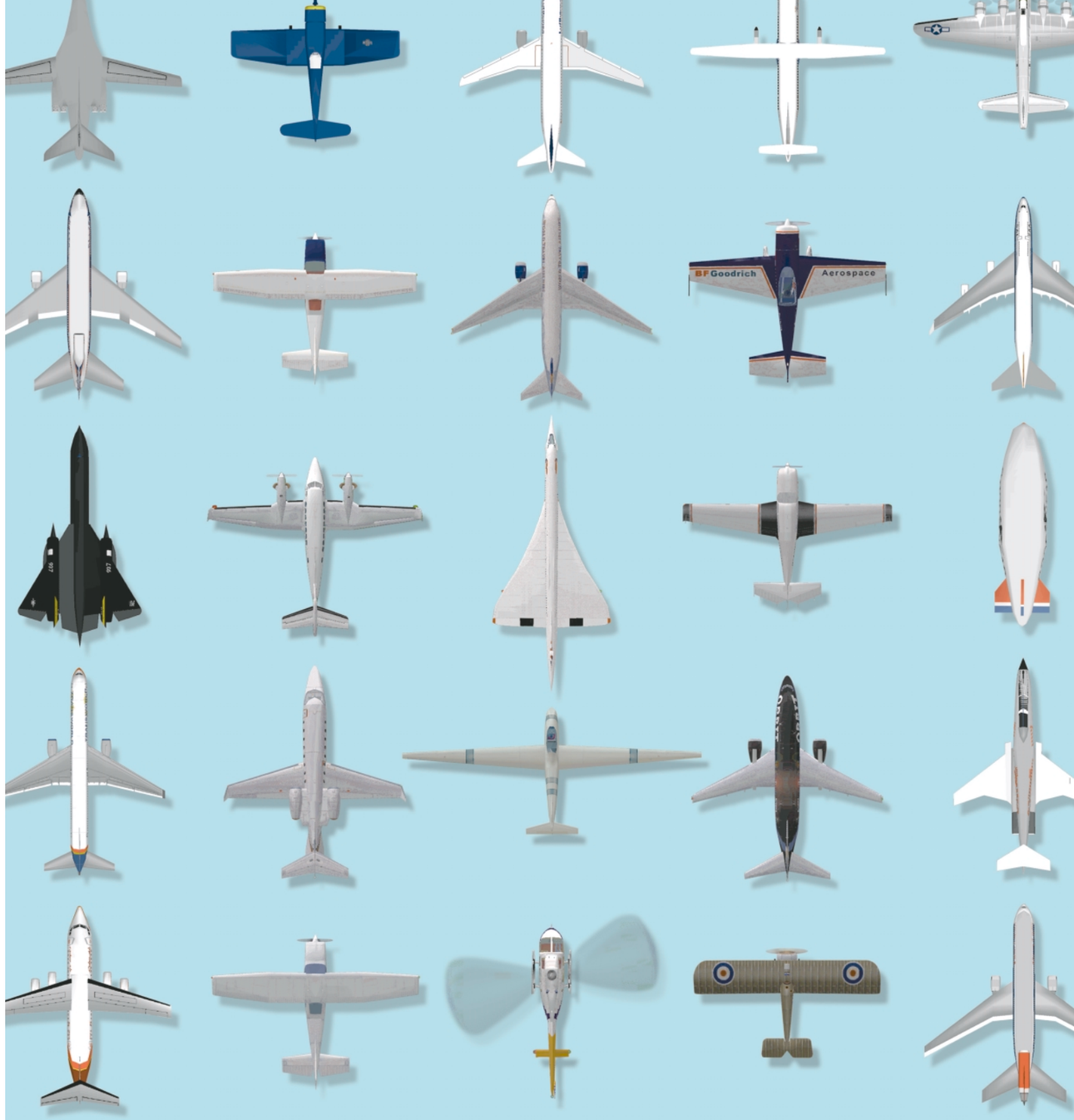
Len Hjalmarson

The Jump Jet over the Malvinas – scrap dealers ahoy!

MISSION BRIEFING
Mission
CONFIDENTIAL
Jump Jet 6a - Dawn Raiders I
Date/Time 1/5/82 08:00
Airfield Stanley
Player aircraft 1 ALPHA Harrier FRS.1
Change/Modify aircraft
Briefing
It's day one of the campaign and 800 Sqn Sea Harriers are following up the night raid by the Vulcan on Stanley airfield with an early morning strike. The airfield is very well defended with 30mm Anti-Aircraft guns and two Roland SAM launchers. The enemy Pucara aircraft may try to get airborne before you arrive and flee to
THE SOUTH ATLANTIC
Pebble Island
WEST FALKLAND
San Carlos
EAST FALKLAND
Goose Green
Port Stanley
Back
Begin Mission

Falklands mission selection in Combat Flight Simulator

PREVIEW			
Publisher:	Just Flight	**Price:**	£24.99
Website:	www.justflight.com	**Expected Release Date:**	January 2001
Developer:	Alpha Simulations		



Ready for take off

Flight Simulator 2000 Professional Edition puts you at the controls of 12 realistically constructed aircraft – with the flexibility to download hundreds more. Plot your flight path on the graphical flight planner, receive daily Jeppesen weather updates, and watch your progress on a real-time moving map. This aircraft training and proficiency aid will teach you how to control a vast array of planes, including how to take-off and land at 20,000 airports worldwide. And if you're feeling brave and want to test your flying skills to the limit, you can create a variety of in-flight problems such as stormy weather and engine failure.

Take to the skies – It's as real as it gets.

Microsoft Flight Simulator 2000 PROFESSIONAL EDITION

For more information visit www.ready4takeoff.co.uk

Microsoft

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IL-2 Sturmovik

The Russian front sets the stage for a top Allied ace

The opposition – the Me 109 wasn't made of concrete, which made them a lot faster

The flying tank – one of the 36,000 Sturmoviks in Uncle Joe's air force

Here's a non-flying tank for comparison – easy to confuse them in the dark

All quiet on the eastern front – but Ivan won't be far away

And the highest scoring Allied ace of World War II was…?

If you answered Ivan Kozhedub, with 62 victories against the Luftwaffe, you know your eastern front! The Russian part in the war effort may feature large in history, but it has been severely neglected by the flight sim industry. IL-2 Sturmovik, a new combat simulation from Blue Byte Software, aims to redress the balance with state-of-the-art graphics, detailed flight models and advanced multiplayer features in a single package. You can even record your missions for later viewing.

Nicknamed the 'flying tank' and 'cement plane' by the soldiers it protected, the Germans referred to the IL-2 as 'Black Death'. Its tough armour and the huge numbers built (over 36,000, more than any other Allied airframe), made it the workhorse of the Soviet air effort. Stalin said that the IL-2 was as necessary to the Red Army as air and bread.

Blue Byte's IL-2 is promised to be a serious simulation fan's dream. The developer, Maddox Games, have set their sights on realism, taking into account every aspect of physics in their flight and environment models. Combined with cutting edge damage models and some of the best graphics yet seen, the specifications of the total package had us sweating in anticipation.

The Single Mission Builder option, which should help IL-2 outlast the competition

A sneak preview at the software shows that no effort has been spared to achieve the desired result. The developer was able to find previously unavailable manuals and factory drawings to faithfully reproduce the IL-2. Furthermore, surviving examples were carefully examined and Russian air force veterans brought in to offer advice.

The Sturmovik was a ground attack aircraft that also fared well in air to air combat. The detail in terrain and ground objects is excellent, as it needs to be. Swooping in low on a troop emplacement or a convoy of trucks becomes a nail-biting experience, with graphical effects like smoke, explosions and tracers coming in for some special attention. Secondary damage and explosions have also been modelled. For the casual pilot, IL-2 will also feature a more 'relaxed' flight model. Takeoffs and landings can be toggled on and off and most of the flight parameters are toned down in this mode for the novice.

Plans are that IL-2 will also include flyable versions of the LaGG-3, MiG-3s, P-39s, and Bf-109s to give a total of 17 different aircraft. Ordnance will include ammo for the IL-2's 20mm cannons, as well as anti-tank rockets, 10kg - 100kg bombs and even torpedoes for anti-ship missions.

The single-player campaign is divided into six historical 'chapters', tracking your career from the steppes of Russia in 1941, to the Brandenburg Gate in Berlin in 1945. Combat includes air support, ground attacks and even naval battles. Players can fly the IL-2, man the gun, fly for either the Russians or the Germans and assume the role of bomber or fighter pilot. The included mission editor will allow virtual pilots to create their own custom campaigns.

In the areas where other simulations have had their weaknesses, IL-2 is aiming to be strong and boasts advanced multiplayer features. Blue Byte will house IL-2's main server, but Sturmovik owners will also be able to set up their own servers or fly on a local area network. IL-2 is said to be capable of supporting up to 32 combatants in a winner-takes-all scenario, or 16 in co-operative mode (8 per side). Hosts can tailor the realism and difficulty to suit the tastes of the pilots.

Graphically, what we've seen so far is incredible. This will be the first aerial combat offering released by Blue Byte, who are well known elsewhere in the games market and it looks like they've picked a winner for their debut. To paraphrase Mark Twain: "rumours about the death of flight sims have been greatly exaggerated!" - with B17-II, Battle of Britain, Combat Flight Simulator 2, Eurofighter Typhoon and Flanker 2.5 around next year, IL-2 Sturmovik will need all the strength of the real 'cement plane' to survive. ■

Len Hjalmarson

PREVIEW

Publisher:	Blue Byte Software	**Price:**	£34.99
Website:	www.bluebyte.com	**Expected Release Date:**	
Developer:	Maddox Games		Spring 2001

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Flight Controls

F-16 Fighter Stick & Pro Throttle (CH Products)
F-16 Fighter Stick & Pro Throttle (CH Products) : The most advanced CH Products' HOTAS system. Fully programmable, it has these lovely features for your gaming pleasure.
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CH Pedals :	£ 64.46 = €103.87
CH Pro Pedals PC :	£ 87.54 = €141.05
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Game Commander (Mindmaker)
GC is a voice command input application that takes you to the next level of PC gaming. It saves you from the myriad of awkward keystrokes used in today's sims by assigning voice commands to them. You want your troops to attack? Simply say, "Attack!"
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Example of shipping costs to UK by Chronopost : 1 item = £6 - 3 item = £7. We offer better rates for more than 2 items shipped in the same time. Do not hesitate to call us. GBP prices are calculated from Euro rate on September 2000.

Korean Combat Pilot

The twilight of the props

The formidable Sea Fury – short of putting a jet in it, there's not much more you can do to improve a piston engined aircraft

Just over half a century ago, in June 1950, the newly formed United Nations rushed to the defence of South Korea, following an invasion by her northern neighbour and so began the Korean War. Propeller driven aircraft took up where they had left off at the end of World War II. Very soon they were pitted against a new generation of jet fighters and in December 1950, the first all-jet duel in history took place when American F-80 Shooting Stars went up against Russian-built MiG-15s.

Just Flight, who were first out of the blocks with an add on for the original Combat Flight Simulator, are soon to release Korean Combat Pilot that will bring a new dimension to Combat Flight Simulator 2. Developers Blue Arrow have put together an impressive sounding package that has 20 new missions and two campaigns to take us back in time to the first tussle of the Cold War (unless you count the Berlin Airlift).

F-80C Shooting Star – the first American jet fighter

Among the promised delights are two carriers, the USS Leyte and USS Essex, moored off the Korean coast, from where you can try your skill at deck takeoffs and landings. There are going to be fifteen different aircraft to fly, from both sides, including three MiG-15 variants, an F-80C Shooting Star (the first US jet fighter) as well as an Australian Navy Fairey Firefly and a Royal Navy Sea Fury. There's even a Bell 47 M.A.S.H. helicopter – nice one Hawkeye! The aircraft will have all the usual refinements we've come to expect, including moving surfaces, pilots heads that change direction with the machine, an authentic sound set and fully realistic flight models.

A M.A.S.H. Bell 47 – about to deliver a wounded soldier into the care of Hotlips, Radar and Hawkeye

A trio of Mig-15s from China, Russia and North Korea

The scenery is promised to be breathtaking, with the whole of North and South Korea included, offshore Islands and mainland China up to the Yula River. Key cities, railways and roads will all feature as mission targets and even the famous Bridges of Toko Ri awaiting an attack, although in the early version we looked at there was no sign of Mickey Rooney in a top hat.

The Korean War was the first time the super powers had really flexed their muscles since World War II and although the war ended in 1953, the two sides directly involved have only just started talking to each other. Korean Combat Pilot should provide us with a unique opportunity to fly across this watershed in the history of military aviation.

Derek Smalls

PREVIEW	
Publisher: Just Flight	**Price:** £19.99
Website: www.justflight.com	**Expected Release Date:**
Developer: Blue Arrow	Spring 2001

Ultimate Airlines

The main menu from Ultimate Airlines - a quick and simple way to set up your flight

Ultimate Airlines flight 421 is now boarding...

Every day of the week, for 52 weeks of the year, thousands of airliners criss-cross our skies ferrying us from one side of the world to the other. As we are all aware, they run (just about) to extremely complex timetables and you can't just hop in a Jumbo Jet and fly to the destination of your choice. It's not a heavy metal taxi service! Actually, this isn't strictly true, as you could always load up Flight Simulator 2000 on your PC, take off from Heathrow at 3am on a Sunday morning in a Jumbo and fly to Paris, circle the airport a few times and then wander off for a cup of tea. All great fun, but it doesn't reflect the vagaries of operating an airline in real life (just ask Richard Branson). However, all is not lost. Just Flight are coming to the rescue of anyone who demands the ultimate in realism for their commercial fights with a ground breaking new piece of software, Ultimate Airlines.

The specification for this product, developed by Flight One, sounds like the perfect recipe for airline fans. Ultimate Airlines is designed to be the definitive companion for those wanting to follow the real world timetables of almost every airline on the planet and it will also give you the ability to undertake these same flights in Flight Simulator 2000. You'll be able to fly for an airline from your desktop with realistic flight routings, real departure and arrival terminal screens as well as a simple interface, pilot management and tracking features.

From what we've seen so far, Ultimate Airlines won't just simulate real world operations - it will be real world operations. Almost every single scheduled flight in the world, from Tyneside to the Tierra del Fuego and all points in between, has been included and plotted for you. Interested to know if the flight attendants will be offering your passengers a meal? Ultimate Airlines will let you know this and more!

If you're a member of a virtual airline, Ultimate Airlines is said to provide the ability to import your routing database and incorporate it with the flights of your real-world counterparts. Now your pilots will see themselves on the same screen with real airlines and who hasn't dreamed of looking at a departure board in real life and seeing their virtual airline flight up there as well?

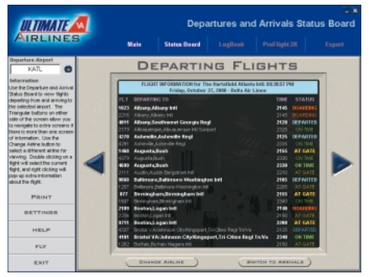
The package is going to include hundreds of thousands (literally) of flight plans for these flights and all at the press of a button. That's literally millions of hours of flying. The flight plans include High and Low Altitude Routing as appropriate and can be exported and are ready to fly in Flight Simulator 2000. If you've got ProFlight 2000, you can link it up to Ultimate Airlines and receive voice ATC for your flight.

All in all, this has got to be the one that commercial aircraft enthusiasts will want for their collection and we'll be reviewing it soon to see if it does what it says on the box. Young Hodges, the office junior, has already started counting the flight plans and he should be finished in two months!

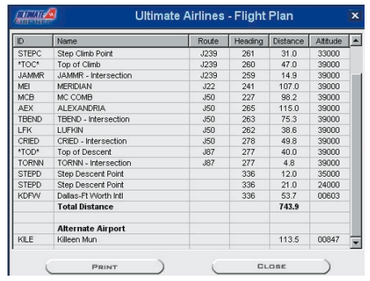
As we went to press Flight One informed us that a downloadable version is now available from their website at www.flight1.com

Derek Smalls

PREVIEW	
Publisher: Just Flight	**Price:** £24.99
Website: www.justflight.com	**Expected Release Date:**
Developers: Flight One	Winter 2000



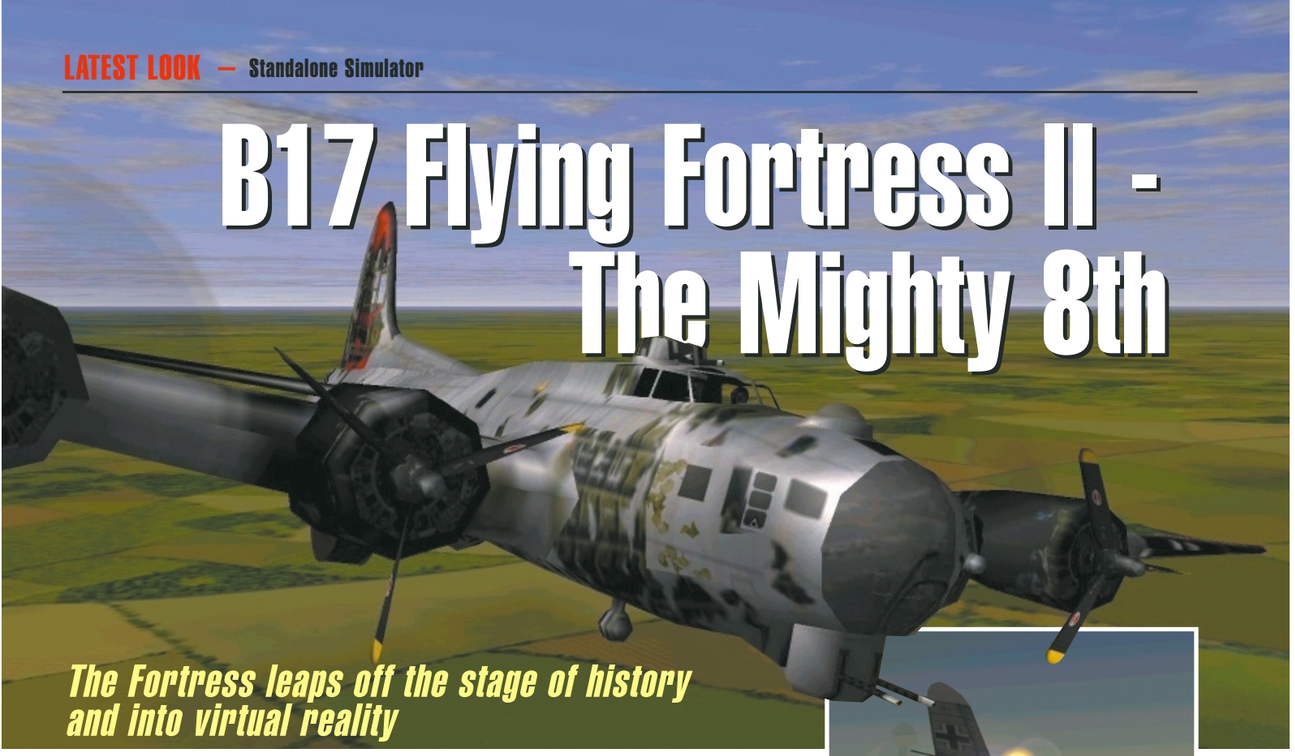
Your very own departure board and what's more, it's the genuine article



One of the many hundreds of thousands of Flight Plans that will be included

Keep a complete log of every flight in the Ultimate Airlines log book

B17 Flying Fortress II - The Mighty 8th



The Fortress leaps off the stage of history and into virtual reality

We first previewed B17 II back in Issue 1 with a release date of 'early 2000'. For Issue 2 we interviewed the developers, Wayward Design and then we sat back and waited. And waited. And waited. However, at last there is light at the end of the tunnel and B17-II should be in the shops in time for Christmas (2000). As it's a year since we last previewed it, we thought we'd take another look, using the latest version of the software and see if B-17 II will be able to take on the competition, in daylight and without an escort.

B17 Flying Fortress II – The Mighty 8th, to use its full name, sets out to simulate the excitement and intensity of the bombing campaign conducted by the US 8th Air Force and is a follow up to Microprose's original B17, released in 1992. Leveraging off the power of modern PCs, the aircraft and the environment are said to look, feel and sound like the real thing, lacking only the smell of cordite and aviation fuel (but they're probably working on this, which may explain the delay). B-17 II is set in late 1943 and continues right through to the end of the war in May 1945. A fairly unique entry in the simulation genre, it blends flying, role-playing and strategy into a single package.

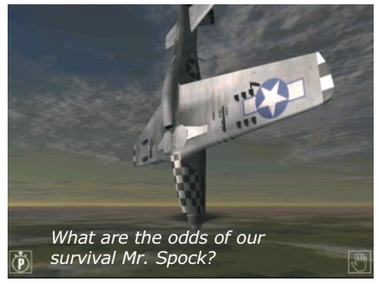
The original B17 – we've come a long way in eight years

We few, we happy few, we band of brothers…

B17-II evokes a sense of community, with motion capture (live people) for each crew position and the entire Fortress is reproduced in painstaking detail. You can choose to occupy any one of the ten crew positions, with AI (artificial intelligence) taking over the other positions, or move to each one in turn and try and do it all.

Crew management is critical, so that when a crew member is wounded one must assign someone to tend the crewman. Losing a critical crew member like the navigator or bombardier increases the likelihood of your mission failing. Furthermore, your team gain in skill as their missions add up. Crew initiative is also a configurable item in the program setup.

The Opposition. This Me109 has just discovered his target



What are the odds of our survival Mr. Spock?

The plane's the thing

The level of detail in the simulation is stunning. A twin-skinned model lends eerie realism to what you will see when flak or cannon score a hit. Ragged holes appear in the skin, through which you can see the landscape or clouds. The sounds of flak bursting and the occasional thump of impact or cry from an injured crewman, raises the tension and the challenge.

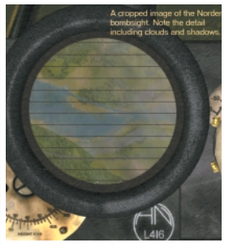
Various calibre guns have different sounds and cause damage relative to weight and velocity. Voice acting is excellent and the sound environment shifts. Firing from the belly turret sounds like shooting out of a tin can (which is not dissimilar to the real thing). The engine sounds are complex and you'll learn to guess the engine RPM or damage state by ear.

In the ball turret we noticed that glass has lost that perfect transparency common to some other simulations and it is usually murky or stained, as it would be in reality. Lighting effects are excellent, tracers are right out of camera gun footage and B17-II supports 'Transform' and 'Lighting' in hardware for the GeForce crowd, bringing reflections and metal surfaces to life. Even the paint shows wear and tear!

For the virtual pilot, B17-II is a feast of detail. Starting from base in full realism mode requires learning the intricacies of inertial starters and cowl flaps. The proper supercharger settings will make or break your first flight, and on return you need to meet with the crew chief to determine maintenance and repair priorities. A shortage of parts may force you to fly or scrap a damaged bird. The pilot had best pay attention if instructed to watch the oil temperature on number 3!

Aircraft panels are completely interactive, with each button and switch for the pilots, navigator and bombardier actually performing their simulated function. There are six unique panel views, breaking down significant systems into manageable chunks.

Fortress in the flak. This scenario will have you sweating



A live view from the Norden bombsight

The bombardier's chair is empty as he moves to help a comrade. Notice the stained plexiglass in the nose

A sim for all seasons

Wayward have modelled seasons, shadows, snow, mountains, roads, hedges, forests, towns, cities, white horses... all at 20cm resolution. The boast is that every road and village in Europe is where it should be and special attention has been paid to the designated targets. The level of detail varies as you descend towards the ground and the multiple types and layers of cloud are fantastic.

We switched to target view after releasing our ordnance on the harbour at Brest. We heard sea gulls crying, then an air raid siren. Suddenly, splashes near the dock indicated the first bomb strikes and then a thundering explosion as two thousand-pounders hit a destroyer. The rest of the ordnance missed and the siren sounded all clear.

Moving back to the outside view, we watched as the bomber formation began a turn over the ocean. With misty clouds drifting below the main layer, and the whitecaps on the water visible far below, we experienced a moment of vertigo. Now that is art!

Pre-mission target and route selection

The Mission Briefing Room. The period settings are excellent

All's well that flies well

B17-II is striking because there are so many approaches to the simulation. You can choose to create a career as a pilot, or stick to the guns. Navigation has its own special requirements, as does the bombardier, with the Norden bombsight modelled accurately. If you prefer, simply jump in and man the waist gun. Difficulty is configurable, so if you want to be sure to reach the target, you can set navigation on 'easy' or even 'flawless'. The nature of the war changes as one moves from 1943 to 1945. The Me262 doesn't show up until late in 1944, and the Me109 evolves from the E4 to K4.

B17-II also gives you the option to fly the escort fighters ('little friends' as the Fortress crews called them) or the Luftwaffe aircraft that were sent to intercept the bomber streams. We're told there will be six fighter options, including the P-51D Mustang, P-47D Thunderbolt, P-38 Lightning, Me 109, FW 190 and Me 262. We spent an interesting hour flying the P-51 to test the flight model and we concluded that the feel is similar to European Air War. For a comparison we spent some time in the Me109 and as you would expect the P-51 is significantly quicker. The 109 will climb faster, but limited fuel reduces combat radius. The artificial intelligence already seems well developed in the early versions of the software. It should present plenty of challenge with fighter pilots using a variety of tactics singly and in groups.

Mission options include single sorties, training missions, quick missions and the campaign mode, which can be carried out entirely as a single crew member, bomber commander or as the squadron commander. The latter allows you to switch bombers if your's goes down and it also lets you choose targets and manage crews.

The whole simulation becomes strategic at the squadron commander level with resource management and crew morale as key factors. Before you fly a mission you have access to reconnaissance film and an intelligence briefing. The campaign allows you to choose your aircraft, crew, target and the ordnance as well as edit route, altitude and waypoints (best to avoid the flak fields). Medals, promotions and statistics are also part of the campaign structure.

FLIGHTS IN WINDOWS MILLENNIUM EDITION

We tested B17-II under Windows 98 SE and Windows ME and both ran well. We went from 128MB to 196MB and reduced disk swapping. We ran mostly at 1024x768, but B17-II looks equally stunning at 640x480, a testimony to careful artwork!

Windows ME not only features reduced load times, the system overhead may also be slightly less.

Most of the simulators we tried ran perfectly, including Combat Flight Simulator 2 and an early version of Battle of Britain. Jane's F/A18 crashed once during a dogfight, but Fly!2K ran perfectly. We've never had such an easy time moving from flight to desktop without closing the simulator (using the Alt, Tab keys).

If you have a stable installation of Windows 98 SE, our advice is to stick with it for the moment. If not, Windows ME may be the ticket. It has an excellent restore facility and boot time can be half that of Windows 98.

Tomorrow and tomorrow…

The big question surrounding B17-II is "will anyone want to buy it after such a wait?" Only time and the software charts will tell. However, the graphics we've seen are very detailed, the strategy and role play elements may appeal outside the flight simulation arena and the flight models are well up to the standards we've come to expect. Allegedly, one of the reasons for the delay in development has been a problem with multiple crew members to the extent that this option has been dropped – in other words you won't be able to join your chums online to crew a B17. This probably won't have a huge impact (yet) on UK sales while we still live in the land of 56K modems and paid phone lines. However, it may prove a big disappointment for online fans and there are plenty of good combat simulators around these days that are only a phone call away. There's also a big danger that after so much talk about B17-II, we'll be ready for something akin to taking a trip in the Memphis Belle from your PC. Mind you, after what we've seen so far, it might be an idea to put on your flying jacket and stand by for a briefing. ■

Len Hjalmarson

PREVIEW

Publisher:	Hasbro Interactive	**Price:**	£TBA
Website:	www.b17flyingfortress.com	**Expected Release Date:**	
Developer:	Wayward Design		Dec 2000

Combat Flight Simulator 2 WWII Pacific Theatre

Play it again Bill...

Microsoft has a habit of never quite making it right first time. Just look at Windows, Office, and Combat Flight Simulator. The latter may have been far from perfect, but it still managed to hold its own against the onslaught of WWII flight sims around at the time. Jane's WWII Fighters was certainly prettier than Microsoft's effort, and European Air War more immersive, but Combat Flight Simulator was a Microsoft product and it sold in droves. Even up to the launch of its sequel some two years later. Moving from Europe to the Pacific, Combat Flight Simulator 2 is finally here and promises to keep the competition at bay with spectacular refinements across the board.

Of course, cosmetic changes are the most obvious in any sequel and Combat Flight Simulator 2 impresses from the off. A comic book feel pervades throughout, from the loading screen through to mission debriefings, exuding far more atmosphere than the original's bland interface. Cartoon movie sequences provide an introduction through the rookie pilot's eyes, conveying the real sense of fear and bewilderment among the young men stuck at sea.

The Pacific War saw the coming of age of carrier aviation, and Combat Flight Simulator 2 does well to capture the excitement of this new era of air combat. As with the original, you can opt for free flight and training modes to familiarise yourself with the new aircraft. Seven flyable steeds are available, all of them legends in their own lifetime. The fearsome Japanese Zero, in A6M2 and A6M5 guises, is as agile as you would expect. Lightly armed, but able to turn inside the opposition it is a supreme dogfighter. The other Japanese aircraft is the NiK2 George, a heavy beast able to outclimb and outgun any American threat.

The American F4D-4 Wildcat is easy to fly but no match for the deadly Zero, so requires skilful flying to be effective. Luckily the refined F6F-3 Hellcat proves much tougher, with its improved manoeuvrability it was the first aircraft to beat the Zero at its own game. Perhaps the most distinctive carrier-borne aircraft is the gull-winged F4U-1 Corsair, mainstay of the US Marines. Together with the twin-engined P-38 Lightning these latter three planes retook the skies from the Japanese in the furious battles that ensued through 1944.

The default 2D panel view of each plane doesn't look that different to previous incarnations. The panel is as sharp as ever, but it's the virtual cockpit that shows off some of the biggest improvements. On higher detail levels the instruments are fully working and the metal superstructure is rivet-perfect in all directions. Far from being superfluous, this makes the target padlock view

Everybody else gets torpedoes, but not on the default flyable aircraft

Bullseye! Who needs fancy bombing computers anyway?

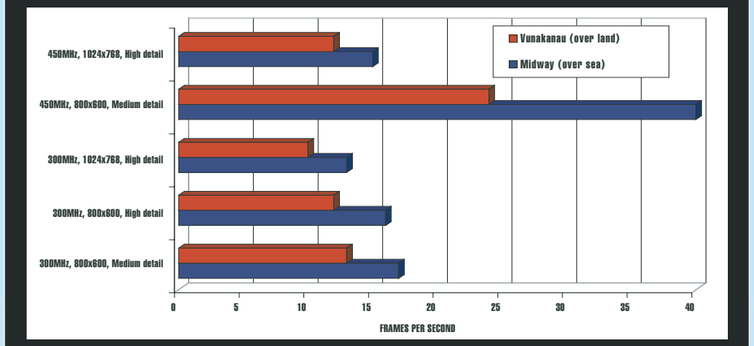
Protect those Island bases at all costs

Take that you Zero!

immeasurably more usable than before. With a little practice it becomes second nature to fly the aircraft while tracking your adversary in an intuitive way.

The aircraft improvements on the inside are nothing compared with the refinements to the outside. Use of larger textures with more colours (16-bit colour depth) means that truly photo-realistic effects can be applied. Look close enough and you can see radio aerials, oil streaks, exhaust markings and even individual rivets. Just like the ships in Star Wars, these craft look battle-worn and not showroom clean as in other sims. The dynamic effects are also something special. Watch the sputters of white and black smoke from the engine as you turn the magnetos to try and start up. Moving flaps and landing gear are convincing, but it's the detailing inside the wheel wells that adds an air of polish that was lacking in the original Combat Flight Simulator.

PERFORMANCE, PERFORMANCE, PERFORMANCE



In life, progress comes at a price. So when we heard that Combat Flight Simulator 2 was going to be based on the Flight Simulator 2000 graphics engine, alarm bells started ringing. Our cheque books groaned, fearing that a compulsory PC upgrade would be inevitable The early version we tested a while back allayed many of our fears, running smoothly on a couple of modest PCs, and the finished product seems to run nicely on a variety of hardware. As we're sure that frame rates are a prime concern to many of you, we decided to do away with woolly 'it ran marvellously on our review PC' talk and ran some benchmarks to quantify matters.

Our test PC is not state-of-the-art by any means (alas!), but we feel is typical of many people's: 300MHz Celeron (Abit BH6 motherboard), 128 Mb RAM, Soundblaster 1024! sound card, Microsoft Force Feedback joystick and with an 8Mb Matrox G200 AGP graphics card. In order to check the effect of processor speed we overclocked our PC to 450MHz. Remember, don't try this at home – see the footnote for details.

We tried two test cases, varying screen resolution, detail level and CPU speed. As we know from Flight Simulator 2000 experience, the new digital elevation modelling looks great over mountainous terrain but can cripple the frame rate. To see how Combat Flight Simulator 2 performed in this respect we chose to dogfight over Vunakanau, a bumpy outcropping in the Pacific. However, much of the action in Combat Flight Simulator 2 takes place over water, so we also measured performance while fighting over Midway, a small island in a large expanse of ocean.

The chart shows a lower bound frame rate for each mission. As with Flight Simulator 2000, the instantaneous frame rate varies considerably depending on the view. Here we show sustained frame rates measured from the 2D panel view. This is a worst case, as from the excellent padlock view the rates are typically 50-100% better than those shown in the chart, achieving 20+ fps for all the tests here.

There is much that can be read into our measurements. Clearly, a 450MHz Celeron can run Combat Flight Simulator 2 at a perfectly acceptable frame rate with 1024x768 resolution. Here we had visibility set to maximum – reducing this to 8-10 miles can improve performance considerably. Dropping from 1024x768 to 800x600 shows a huge increase in performance, which is likely to be graphics card dependent. One thing that's clear is the effect of rendering the mountainous terrain, dropping from 40fps to 24fps over land. Luckily, reducing the 'terrain complexity' setting brings the frame rate right back up while still looking great. Remember that the Matrox G200 card is a good generation or two behind the current crop of GeForce II and Voodoo 5000 cards, so expect to be able to run at high resolution with a newer card.

The 300MHz Celeron results are a little more interesting. Here we can see relatively little difference at all between the different settings, suggesting that Combat Flight Simulator 2 is rather restricted by processor horsepower. Dropping from 1024x768 to 800x600 resolution allows for perfectly acceptable performance. A better solution we found was to tweak the display settings at 1024x768, lowering terrain detail and visibility, which achieved a sustained 14 fps.

While the hardware requirements for Combat Flight Simulator 2 are unsurprisingly greater than for its predecessor, the difference in quality is well worth it if you have a reasonable PC and graphics card. Transform and Lighting support is an extra bonus too and with a monster machine, Combat Flight Simulator 2 looks truly stunning in all of its animated glory.

800x600 with high detail: a good compromise for any PC that doesn't cut the mustard

800x600 with medium detail: sacrificing quality makes CFS2 zip along on slower processors

Overclocking your CPU is a way of getting increased performance by running it at a speed higher than it is rated for. However, you risk serious damage to your PC. Don't do it unless you are an experienced user and don't mind blowing up your machine and losing everything on it if it all goes wrong - we're not joking! For more information about overclocking try http://www.anandtech.com. PC Pilot cannot be held liable for any damage caused by attempts to overclock your PC.

TRAINING MISSION
Available missions
Procedure for lining up and working with the landing signal officer (LSO) to land on a carrier.

The 300-page manual and training missions certainly help

Much has been borrowed from its peaceable stable mate Flight Simulator 2000, including the main graphics engine. The scenery and weather dialogue boxes will be familiar to Flight Simulator 2000 users, as will the terrain. Rolling mountains use the DEM (digital elevation modelling) technology introduced in Flight Simulator 2000, although this can cause some problems with older scenery add-ons (see the README file for the 'flatten terrain' workaround). The Atolls of the Pacific spring up out of the ocean surrounded by a halo of postcard perfect turquoise tranquillity. Coupled with fluffy clouds and stunning dawn and dusk lighting effects, the vista is always memorable. Whether it's a broad expanse of water to the horizon or a string of islands poking out of the drink, the feeling of space is evident. The effect of this extra graphical detail on frame rate is not as bad as we feared – see the performance box for our benchmark tests.

The enhancements in Combat Flight Simulator 2 are definitely more than skin deep. Three aircraft realism levels allow you to break yourself in gently, or jump to a fully fledged flight model. Beginners will find the 'easy' mode both fun and challenging. With aids such as the 3D enemy target indicator, radar map and aircraft labelling enabled, dogfighting is a blast. For die-hard Flight Simulator fans the 'standard' keyboard layout can be used. There is also a second arrangement that is more combat-oriented and well worth migrating to if you persevere and forget those old habits (and it's more suitable for rookies). Jumping to full-on realism, you can now control fuel mixture, prop angle and engine cowl flaps. Going through the start-up checklists correctly rewards you with a puff of smoke as the engine splutters into life. On your first carrier take off, make sure that the torque and prop wash effects don't roll you sideways as you come off the carrier deck. No catapults here, just propeller power and some gentle stick and pedal action to get you up into the air and on your way.

DIY DOGFIGHTERS

Combat Flight Simulator 2 is a bit disappointing in providing only seven different aircraft to fly, especially when there are so many other non-flyable aircraft included. Luckily, Microsoft has kept to the Flight Simulator 2000 and Combat Flight Simulator aircraft formats. Simply copy the aircraft folders into the Combat Flight Simulator 2 install directory on your hard drive and crank up those engines.

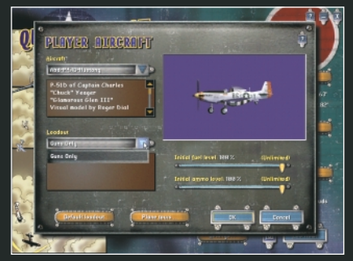
While imported planes look good from the outside and the 2D panels transfer nicely, the virtual cockpit views are as bad as before. Comparing even the best Combat Flight Simulator add-on aircraft with the new default ones shows exactly how far the graphics have come. See the screenshots comparing the Corsair from Abacus' excellent Pacific Theatre add-on with the new Corsair from Microsoft. While the older model looks authentic in terms of geometry and detailing, it is painfully primitive next to the utterly photo-realistic new version. This straight comparison isn't a fair one, but instead serves to demonstrate the possibilities that await. The real challenge will be making the virtual cockpits look realistic enough to be able to use the padlock view in anger. Be sure to see some truly spectacular looking planes from veteran Flight Simulator designers. Freeware, shareware and commercial developers will undoubtedly come up with the goods in time.

Similarly, Microsoft has done a fine job using the Flight Simulator 2000 scenery engine for the Pacific region. The digital elevation modelled terrain makes the volcanic outcroppings in the ocean look forbidding. Again, we imported the scenery from Abacus' Pacific Theatre to remind us how one of the best add-ons looked next to Combat Flight Simulator 2. The difference is clear and with developers now experienced with Flight Simulator 2000 terrain modelling it will be no time before we see scenery add-ons appearing.

The folks in Seattle certainly know when they're onto a good thing and leaving Flight Simulator, in all of its guises, open for others to expand has been key to its success. Combat Flight Simulator 2 has enough under the bonnet enhancements to really excite developers. With a baseline product this good the community will certainly rise to the occasion to produce some spectacular add-ons. Let the designing begin!

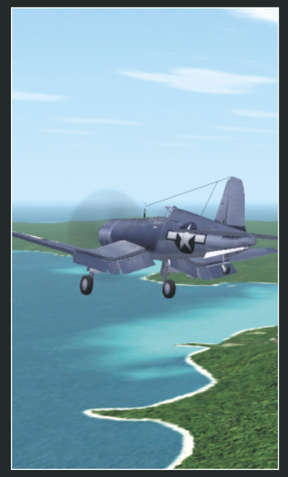
Abacus' Pacific Theatre Corsair looks precise, as is the scenery

New and improved, the level of detail is astounding



Roger Dial's P-51D imported perfectly from last issue's free CD

Tally Ho, where are the Japs?



American beauty, if you can fend off the Japanese

ROCK AND ROLLING AT SEA

The sight of an aircraft carrier or small island airstrip is the finest view a naval aviator can hope for. What separates the men from the boys is being able to land a half-wrecked plane onto a football pitch that's rolling all over the high seas. Taking off from a carrier can be pretty hairy too, as you come off the end of the deck with barely enough airspeed to prevent you from stalling. Life onboard a carrier is never boring.

Come on girl, you can do it

Everything out: flaps, gear and don't forget that tailhook

The LSO is a speed demon, just ignore him

Tom Cruise eat your heart out

Ooops, we did it again

Welcome to the Cartoon Network

BRICKS AND MORTAR

Microsoft's Flight Simulators aren't just games, but are a way of life for many. This is down to the open architecture, and Combat Flight Simulator 2 extends this one stage further by including the mission builder used by the development team themselves. While there is no technical support for it and the manual only has a few dedicated pages, the online help and easy-to-use interface means that it is still streets ahead of the Excel-based affair cobbled together for the original Combat Flight Simulator.

The eight mission types define the basic framework around which you can build your custom scenario: Escort, CAP, Intercept, Fighter Sweep, Strike, Anti-ship, Search and Destroy and Close Air Support. You can set up waypoints, events and triggers easily, and together with the flexible aircraft and scenery import capability, the possibilities are endless. Even if you don't fancy taking time out to create your own new challenges, there are plenty of talented folks out there who will – and put them on the web for you to download…

Combat Flight Simulator 2 Web Sites:
Combat Flight Centre -
www.combatfs.com
CFS2 Online - http://cfs2.dogfighter.com
AVSIM - www.avsim.com

The graphical interface of the mission builder beats Excel any day

Mmmm, think I'll pop some ack-ack here, ha ha ha

Add reconnaisance photos of the target and mission descriptions here

Into the wild blue yonder

The virtual cockpit padlock view is utterly immersive

The 'warp' function puts your next waypoint a mere key press away, keeping the action coming. There's plenty of radio chatter to help you figure out what's going on, but if you've read your mission briefing carefully, then there shouldn't be too many surprises. Hitting the 'I' key brings up the 'advanced info' dialogue box to let you recap the mission goals and see how many you've completed.

Once the bullets start flying, the true nature of your plane will soon become apparent. Yanking and banking will send you into a spin on all but the easiest level. Pulling out of the spin by centreing the stick and applying opposite rudder works well though and is evidence of the improved flight physics taken from Flight Simulator 2000. Indeed, all of the aircraft fly distinctively and have their own strengths and weaknesses. The excellent 300-page manual details tactics and how to fight in each plane to take full advantage of its characteristics. With the padlock view enabled and detail levels tuned for a decent frame rate, the action is fluid and wonderfully engrossing. Enemy intelligence is far more in depth now. The computer is more aware of energy states, meaning that the opposition are happy performing manoeuvers like the yo-yo to stay on your tail and not overshoot if you slam on the brakes. He's not afraid to peel off when out of ammo or fuel either, surviving to fight another day. The action is nicely balanced to provide an excellent dogfighting (and ground attack) experience for both beginners and veterans.

The damage modelling has been refined now to allow more fragmentation of planes. Shooting off a wingtip or blowing away an opponents tail will spray debris everywhere, and not just the small stuff. Be wary of wings scything through your cockpit if you're too close to your victim. Flames, white and black smoke indicate different types of damage, as well as bullet holes and structural components poking out where they really shouldn't be!

Once your job is done then it's not quite plain sailing. Landing your possibly wounded aircraft on a pitching and rolling carrier deck is every bit as challenging as mixing it up with enemy fighters. Following the foaming wake of your mother carrier will lead you home, but in wind and rain it requires supreme concentration to catch a three-wire. Luckily the LSO (landing signal officer, not the London Symphony Orchestra) is on hand to give you instructions, but his advice can be a little wayward – especially as he has a penchant for fast landings.

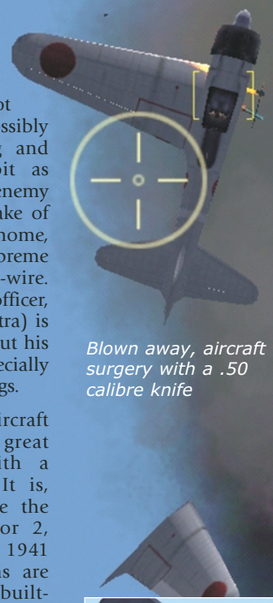
Quick combat, with up to eight aircraft on each side provides some great instant gratification, along with a smattering of single missions. It is, however, the campaigns that are the core of Combat Flight Simulator 2, covering the Pacific War from late 1941 through to 1944. The campaigns are branching with some dynamism built-in, missions being dependent on whether targets were destroyed previously. With 120 possible missions per campaign, excitement is guaranteed.

As with Flight Simulator 2000 last year, Combat Flight Simulator 2 Pacific Theatre is a major overhaul that reaffirms Microsoft's dominance of the WWII flight simulator market. The improved graphics are stunning, but it is the refinements in flight modelling and combat operations that lift this well above the competition. The Mission Builder and open architecture mean that third-party developers are well catered for. So if you have the PC to run it, or are thinking of upgrading, then Combat Flight Simulator 2 is a wonderful investment that will provide hundreds of hours of thrilling entertainment for rookies and aces alike. ■

Kenji Takeda

The dynamic lighting is especially pretty at night

The most feared plane in the Pacific, the almighty Zero



Blown away, aircraft surgery with a .50 calibre knife

The moving parts and texture detail are stunning

REVIEW SCORE:	
Publisher: Microsoft	**Price:** £29.99 (£10 rebate for CFS/FS2000 owners)
Website: www.microsoft.com/games/cfs2	
Developer: Microsoft	**Release Date:** Out Now

At a glance: Quite simply the best all around WWII flight simulator there is. With superb audio-visual polish and under the bonnet detailing, the open architecture means that its expandability is limitless. It requires a decent PC though.

System Requirements: PII 266, 32Mb RAM, 3D graphics card
Recommended: PII 400, 128Mb RAM, 32 Mb 3D graphics card

Crimson Skies

Find yourself whizzing over a movie studio

"Here's looking at you, Ginger..."

You get to bail out if things go wrong

Anyone who has spent more than sixty years on the planet will remember the 1930s and 1940s, when art was distinctly 'deco', heroes were played by Errol Flynn or written by W. E. Johns and anyone who got shot down was always hit in the engine, but bailed out and made it back for tea and muffins. The reality may have been a bit different, but as any tabloid journalist will tell you, never let reality get in the way of a good story!

Crimson Skies, the latest foray from Microsoft into the 'leisure' genre (games?) reminds us of the thirties not as they were, but as they should have been. It's set in an 'alternative' America, history has been re-written, it's post-depression (1937 or thereabouts) and the American States have withdrawn into themselves, afraid of a spreading influenza virus. Trains and roads have deteriorated and only the inventive aircraft makers are producing transport. So, off to the skies we all go, pirates and goodies alike. Air travel becomes a vital lifeline with giant Zeppelins (rather than airships?) crossing the skies to carry passengers and cargo, at the mercy of air pirates and rival air militias. The whole style of the packaging and the manuals is reminiscent of the black and white movie era of Hollywood between the wars. There is a vein of mocking humour running through this package, as well, which we found quite attractive.

However, is this too frothy a brew for consideration by PC Pilot? Are we stepping into the vacuum left by the late PC Gaming World magazine? Not really - remember that part of the website address for Flight Simulator 2000 is microsoft.com/games/fs2000 – we always say flight simulation isn't a game but it's a pity Microsoft don't know that. Still, every once in a while a gourmet will wander into a fast food restaurant, so before you have some duck a'lorange in Combat Flight Simulator 2, enjoy this burger and chips!

The story centres on air pirate Nathan Zachary, an all-American 1930s Robin Hood figure (thankfully more Flynn than Costner), with a long history of daredevil mercenary flying, a bit like our own publishing director (or so he tells us). An ace World War One veteran and ex-Russian Revolution pilot among other things, he has quite an eye for the ladies (again, uncannily similar to our PD) and the briefing windows carry a number of engaging black and white photos of the females in his/your life (although, as the name of the developer is 'Zipper' we did raise a quizzical eyebrow). The documentation is well put together and for pulp fiction fans, quite interesting, giving some shape to the characters in the aircraft you will be fighting and flying with. To maintain a degree of political correctness, there seems to be a slight overbalance of women pilots to men, both as friends and foes, but in this area of enterprise girls will always be boys.

Crimson Skies has had a lot of hype both from websites and games magazines, but when you open this Pandora's box, don't expect a normal flight simulation program. This is unashamedly a shoot 'em up. Nevertheless, it demands quite considerable stunt flying and gunnery skills. It can be classed as closer to Combat Flight Simulator than to Flight Simulator 2000, but much more fun and with the added novelty of a movie style storyline.

What you don't get

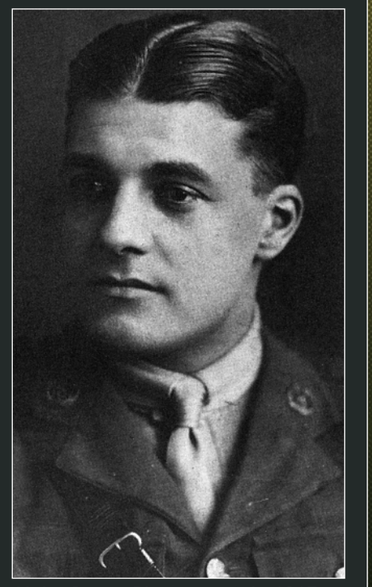
There aren't the options you'd expect in a normal simulator with Crimson Skies, so no change of weather or time of day is available. However, the given weather, clouds, rain and so on is very realistic and effective. You don't have airfields or any time to practice take-offs and landings, as most action starts with you either already in the sky, or being dropped from your home base airship.

Another nasty goes down in entertaining agony

The mighty Spruce Goose (still) struggles to get airborne

The real Nathan Zachary?

You'll see plenty written about Nathan Zachary, the central character in Crimson Skies that likens him to Errol Flynn. However, apart from his brilliant portrayal of a flawed WWI pilot in the Dawn Patrol (1938), most of Flynn's classic roles were historical figures and Nathan Zachary is far more contemporary to the 1930s. However, PC Pilot has learned that the developers actually based their hero on a real individual and a British one at that. Major James Bigglesworth, DSO, DFC, MC, was an RFC pilot who achieved some notoriety in aviation circles after WWI. A veteran of 169 and 266 squadrons, Bigglesworth survived the Western Front, only to get involved in a number of dubious adventures around the world in the 1920s and 1930s. While other ex-airmen were barnstorming and breaking endurance records, his escapades included archaeological hunts, mineral prospecting and mercenary combat flying. He even fought on both sides of the Spanish Civil War and ran an air transport service across the Channel. Rejoining the RAF in 1939, he flew throughout WWII (despite being over 40) and afterwards worked on the fringes of the security services as an adviser on aviation matters. He retired in the late 1960s, but died soon afterwards in mysterious circumstances, when at the age of 76 he crashed a newly rebuilt Spitfire at an air display, that he was flying in without a permit.



Major James Bigglesworth in 1917

You can't change your aircraft in flight but have to stick to your assigned steed. Of course, in true Hollywood style, either you or your daredevil sidekicks may climb from one aircraft into another as part of the storyline from time to time. You might even have to pick up a passenger from a train. There is no choice of starting points, just fixed missions or instant action games, but there are plenty of these and some are very challenging.

We also discovered that you can't change campaigns until you have worked your way successfully through them. This may please some people and annoy others. We were rather keen to try them all out in advance, so found this aspect disappointing. However, persistence pays off and after four tries at completing a mission, we suddenly got a message asking if we would like to skip this one. This seemed a good idea, which we greeted with relief. It means that if you want to get a look at what's coming next, you can crash your aircraft four times on each mission and so gain entrance to the next one – time consuming, but effective. There are 24 missions altogether and 19 instant action scenarios, which is a lot of crashes, so practice is probably not a bad thing.

What you do get

If Crimson Skies offers nothing else, it does have plenty going on. The instant action situations are imaginative and colourful, with some really well thought out places for your dog fighting or airship attacks to take place. You may find yourself over Manhattan at night, circling Hawaii or whizzing above a Hollywood movie studio. There are plenty of voices on the radio intercom keeping you in the picture and helping with the drama and pace. These can be switched off if you find them a bit repetitive. Unfortunately some of the 'British' accents are imitation cockney (Dick Van Dyke flies again!) and not very authentic to ears trained within the sound of Bow Bells (or even Times Square). In fact, the enemy in many of the missions for Nathan and his team is often British. We wondered about this for a while, but perhaps with an Executive Officer called Weisman, a President called Straub and the fictional creator of the game named Dr Fassenbiender, the Crimson Skies team considered that the Germans had been the baddies for too long.

The 24 more complex campaigns are amusingly written and presented. Briefings provide a good feeling of involvement with the group of pilots that fly alongside you and are not too long. Maps and photos pertinent to each mission are flashed up as the briefing progresses and afterwards, if you complete the mission, there are newspaper cuttings and photographs available as souvenirs. These can be enlarged and saved as jpeg files on your desktop, then printed out if you really must.

You get excellent cloud and general weather effects. These are not controllable

All briefings include pictorial details

Interesting terrain in Hollywood

There is some demanding stunt flying required

Strange objects rise out of the sea and must be dealt with

but are pretty authentic. When dog fighting around a couple of airships, perhaps trying to protect one and trash another, the clouds help the realism a great deal. You can sometimes find yourself completely in cloud and trying to fight in instrument conditions, although there are plenty of clues to help you through.

The terrain is often mountainous with high bridges and interesting valleys to fly under and along. The scenery is some of the best and most detailed we have seen anywhere, even in close-up. There are islands, 3D trees, submarines, barrage balloons and factories. The missions and action flights around the Rockies are particularly impressive. When hit by gunfire or rockets the enemy planes and buildings explode with wonderful bangs and flames – or as they say in the trade 'damage modelling is exemplary'. On a more serious note, the familiar 'slide show' problems of Flight Simulator 2000 didn't manifest themselves, which may be as good a reason as any for giving Crimson Skies a spin.

During your aerial battles there are a lot of handy aids. Enemy aircraft, airships and boats are labelled in red, with friendly craft in green. Arrows and mini-views show in which direction your next target will be. If you forget the briefing, the plot of each mission will unfold through on-screen instructions. There's also the option to customise your own adventure. Using the Instant Action interface, you can choose your wingmen, their planes, your location, guns and ammunition. You also get to bail out if things go wrong and we liked this aspect very much. A little figure can be seen climbing from your cockpit and parachuting down to live and fight another day, which is most satisfying (Combat Flight Simulator's fatal crash and dirge was obviously too depressing).

However, probably the most significant feature (for us, anyway) of Crimson Skies, is the array of fantasy aeroplanes that it contains. You will never have seen aircraft quite like these. They remind one more of Star Wars than of the 1930s. A 'twin–engined Supermarine S6b on steroids' was one description we rather liked. They are inventive, aggressive and very agile, although anyone seeing names like Valiant, Fury, Vampire and Firebrand may think they've stepped into an alternative RAF Collection. The Crimson Skies aircraft are all fast piston engine types, of course (no jets), so the sounds are fruity and evocative of WWII machines. There is also a plane construction studio where you can put together your own limited design of plane. A complete repaint job can turn your own aircraft and those of your team into any style you fancy. Apart from the Zeppelins, there is one (just about) authentic machine, which is Howard Hughes' ill-fated, enormous, Spruce Goose. A timely warning to any modern day multi billionaire, to stick to what they do best – in Hughes' case, oil and for you know who, who cares?

A game for flight simmers or a flight sim for gamers?

The original designers of Crimson Skies (which began life as a board game) say they set out to create an atmosphere with a flamboyant swashbuckling feel to it. Not a strict flight sim nor an arcade game, but something in between that would allow the player a chance to feel like a hero. We think they have succeeded in their aim. If you spend a lot of time in serious mode, piloting your Boeing 747 from Sydney to Tokyo, then the very colourful and satisfying Crimson Skies may be just the thing you need to help you unwind. Ask for it for Christmas - it's something the whole family can enjoy. ■

Christopher Jarman

REVIEW SCORE:			
Publisher:	Microsoft	**Price:**	£29.99
Developer:	Zipper Interactive	**Release Date:**	Out Now
Website:	www.microsoft.com/games/crimsonskies		

At a glance: Not a serious flight sim, but more character than the average game, it will test your flying skills. You won't need a PPL, just a sense of humour.

SYSTEM REQUIREMENTS: PII 266, 64Mb RAM, 8Mb 3D graphics card
RECOMMENDED: PIII 400, 128MB RAM, 32Mb 3D graphics card

ProFlight 2000

You have control

There are a number of products dedicated to the creation of flight adventures for Flight Simulator 2000, invariably many of these combine the operation with a realistic rendition of ATC. The intention is always to improve the rather basic system included in Flight Simulator 2000 and by doing so make your simulated flights more realistic.

However the perceived success of such products is often the source of debate, particularly in newsgroups and flight sim forums, where fans immediately leap to contest any adverse comments made by the more pedantic enthusiasts, who seem to be looking for an artificial intelligence that challenges reality. Perhaps ProFlight 2000 will be the answer to their quest.

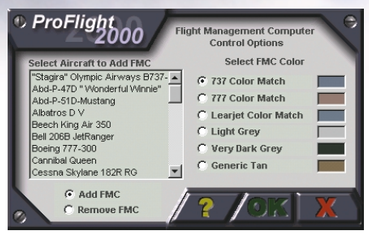
ProFlight 2000 is the latest release from Just Flight and the second incarnation of this accomplished adventure-building package, now optimised for Flight Simulator 2000. It combines realistic adventures you can create yourself, with ATC that doesn't sound like the talking clock on a bad day. Similar to the previous version, ProFlight 2000 includes a fully operational FMC (flight management computer). This is a wondrous piece of programming that can be added (or removed) via a simple dialogue to all your Flight Simulator 2000 aircraft, although it does look a bit odd inside the cockpit of a Cessna 172. In an effort to make the FMC look as though it belongs, the authors have provided a range of background colours for you to choose from, so you don't get an A320 with a nicely designed pale blue/grey control panel, displaying a brown FMC.

The package includes a comprehensive FMC tutorial

This version also introduces a virtual co-pilot mode, which gives the pilot a breathing space when things get a bit hectic. It offers two levels of help, PIC (pilot in command) mode, where the co-pilot does everything for you, or COMM mode, where he simply handles all the frequency changes. Another new option worth a mention is the warp mode (nothing to do with di-lithium engines), designed for those long intercontinental flights. Once you're clear of the airport and in the cruise, you can elect to be teleported across the world to a waypoint you designate. This means you don't have to sit through the tedious parts of the flight or use slew, which doesn't usually work in adventures anyway.

Creating an adventure with ProFlight 2000 is either a two or three stage process, beginning with the building of a flight plan. You can use the planner provided within Flight Simulator, or any other planner that is capable of outputting Flight Simulator 2000 format plans. If you already own Flight One's Flight Director, then you can create a plan directly from within Pro Flight 2000.

The next step is to launch the program, import the saved flight plan and begin to customise the adventure. Starting with the pilot's name, the aircraft type and call sign you want ATC to use, followed by the type of plan you need. This



Managing the FMC with your installed aircraft

The functioning FMC in use in the default Beech King Air 350

can be IFR or VFR, using your preferred frequency for flight service, cruise altitude and adventure start time. You also have the facility to choose the pilot's voice and accent you'll hear throughout the flight. There are six different British voices supplied, as well as French, German, Spanish, Asian, American and Australian. In addition a small checkbox on this page allows users of Game Commander (reviewed in issue 4), to control ProFlight by voice command. Incidentally, if you want to give this a try, the producers have thoughtfully provided a demo version on the installation CD, although you can of course try the demo version of Game Commander on this issue's free CD.

At this point you can compile the adventure as it is, or you can go to the settings screen and fine-tune it to suit your own particular needs. For example, if you want ATC to give you heading commands at every waypoint, you simply check the hand holding option. You can also define the communication settings for the various ATC facilities, including the delay between random radio chatter. Once you're happy with the settings, click the compile button and wait for ProFlight 2000 to create the adventure. Then switch to Flight Simulator 2000 and load the adventure in the normal manner from the menu option.

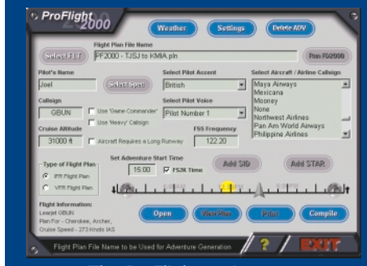
Actually flying the adventures is brilliant. You can sit back and watch the PIC do it the right way, including all heading and frequency changes, answering ATC calls, or if you prefer you can try it yourself. The ATC interaction is not the least bit staccato and quickly has you believing you're on a real flight, with optimised sound files that take account of the current time and weather conditions. To make this even more authentic, the authors use the current controller's voice for all chatter between other pilots.

The program comes with fully interactive tutorials to get you started, including a separate on-line manual that details the complexities of the FMC. You'll also find six adventures ready to fly within the adventure directory, providing progressively less help for each flight, together with a full set of plates for them, produced using a demo version of Jeppesen's Simcharts.

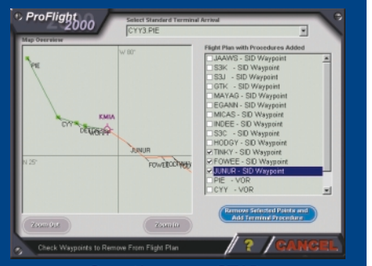
After giving this software package a lot of use, we had to ask if ProFlight 2000 delivers the goods? We think it does. There will always be issues regarding the routing around airfields provided by simulated ATC, particularly in VFR conditions. Having said that, if you follow the instructions you're given and try to emulate what real pilots do, you'll enjoy the adventures created with ProFlight 2000. It's a vast improvement on the limited ATC provide in Flight Simulator 2000. ■

Joe Lavery

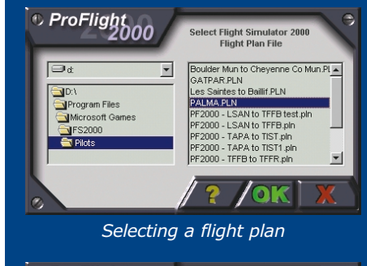
CREATING A FLIGHT PLAN IN FS2000



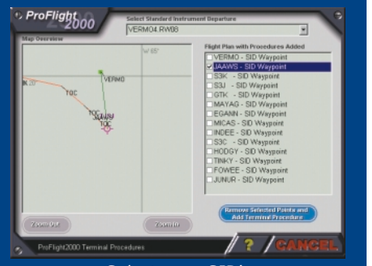
The ProFlight main menu



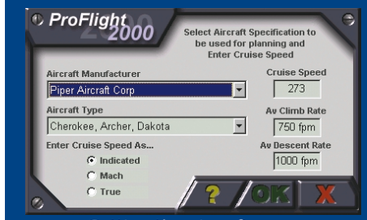
Selecting your STARs



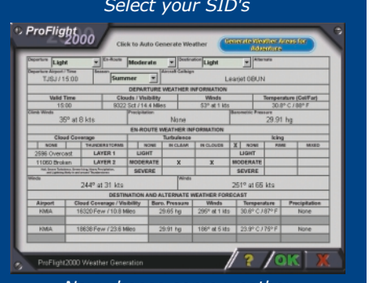
Selecting a flight plan



Select your SID's



Setting the aircraft specs



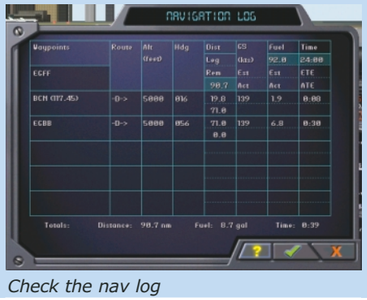
Now choose some weather

Compile the adventure and you're ready to go

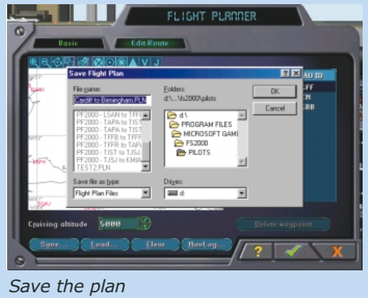
Failure to plan is to plan for failure

Choose your route

Preview the plan



Check the nav log



Save the plan

PREFLIGHT BRIEFING
PF2000 - EGFF to EGBB Adventure Briefing
Beechcraft G36M3 from EGFF to EGBB
Departure Airport - EGFF, Cardiff
Destination Airport - EGBB, Birmingham
Alternate Airport - EGBB, Birmingham
Cruise Altitude - 01000 Feet
Cruise Speed - 273 Knots
Departure Time - 07:00
Estimated Time Enroute - 00:33
DEPARTURE AIRPORT INFORMATION
CLR GROUND TOWER DEPART
Print

The pre-flight section

REVIEW SCORE:

Publisher:	Just Flight	**Price:**	£34.99
Developer:	AETI	**Release Date:**	Out Now
Website:	www.justflight.com		

At a glance: This is one of the best ATC/adventure generators we've seen, with enough customisation potential for the most demanding users. The interface is well designed, so it shouldn't be daunting for those new to the world of Flight Simulator.

SYSTEM REQUIREMENTS: PII 300, 128Mb RAM, 3D graphics card

RECOMMENDED: PIII 700, 256Mb RAM, 32Mb 3D graphics card

Flying in familiar skies

English Airports

Touch and go on the 06 L runway at Manchester

The scenery areas in Flight Simulator 2000 are practically global, with thousands of airports covering every country in the world. Some of these are detailed to a realistic level, whereas the vast majority are simply runways, taxiways and a couple of (very) basic buildings. Sadly, most of the UK falls within the latter group, with even major airports looking more like flying clubs on a bad day. Consequently, the launch of a product that attempts to redress the balance should certainly be popular with anyone who likes to fly in familiar skies.

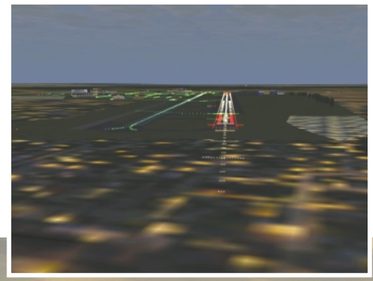
English Airports is a new scenery package from Barry Perfect, themed around six of the major airports in England. At the moment it's available as shareware, on download (more about this later) and covers Heathrow, Birmingham, Stansted, Luton, Gatwick and Manchester. The package includes a new range of static aircraft and other vehicles designed by the author, who stresses that they were not simply adapted from existing data. They certainly improve the reality factor, particularly when taxiing. Nothing looks worse than a huge airport totally devoid of any other traffic. A nice bonus is that if you own a copy of FS Traffic, then you can make use of the freeware tracks that have already been designed for these airports.

The Business centre at Stansted airport

Stansted is one of the most detailed airports in the package

As far as we could ascertain from the schematics found in our Jeppesen airfield manual, the airports are factually correct, both in terms of their location and physical dimensions. However, the textures used by Barry Perfect are not as detailed, when compared to those found in Airport 2000 from Wilco, or German Airports 3 from Aerosoft. It may be, of course, that the author has made them intentionally less complex, in order to improve the frame rate. A problem that both the previously mentioned products suffered from, particularly on PC systems without 3D acceleration, or with less than 128 Mb of RAM. If better performance was the intention, then it seems to have worked, because we didn't find any appreciable loss in frame rate compared to the default scenery. To be fair, the buildings, taxiways and air bridges give a fair representation of the genuine article, which nobody else has done commercially up to now.

Luton Airport with its diverse array of buildings and realistic static aircraft



The lighting effects on approach are excellent

All the airports have fully operational docking gates, with one of three different automated lighting systems to guide you to the stand and in some cases includes the good old marshaller as well. The air bridges move towards the plane as you approach the parking position when viewed from the cockpit, although strangely, when you take an outside view they don't appear to have moved at all.

Finally, the airports also come with well designed night textures that look the part in a darkened room. We've also heard that Just Flight are working with Barry to bring out a boxed CD-ROM edition of these airports priced at £19.99. They say that improvements are being made to the static scenery and they're addding more FS Traffic tracks, which all sounds good to us. Just Flight say that the product should be available as you read this. ■

Joe Lavery

REVIEW SCORE:

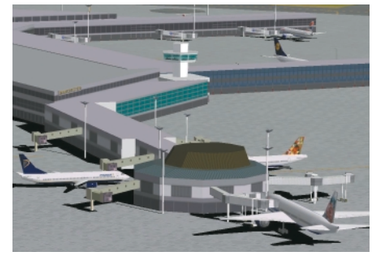
Publisher:	Just Flight/Barry Perfect	**Price:**	£16.99
Developer:	Barry Perfect	**Release Date:**	Out Now
Website:	www.justflight.com/www.gbairports.co.uk		

At a glance: English Airports is a vast improvement on the default UK scenery provided with FS2000, downloadable at a realistic price. Although it doesn't offer the same degree of detail as some of the other commercial packages, it actually works, which must be good.

SYSTEM REQUIREMENTS: PII 300, 128Mb RAM, 3D graphics card

RECOMMENDED: PIII 700, 256Mb RAM, 32Mb 3D graphics card

An overview of Birmingham airport as night falls



Manchester looks much better with the static scenery enabled

A pilot's eye view approaching the gate at Manchester

HEATHROW AIRPORT FROM THREE DIFFERENT VIEWPOINTS

THESE SHOTS OF GATWICK AND BIRMINGHAM SHOW SOME OF THE NEW STATIC SCENERY NOW SUPPLIED

The airports look as big as the real thing

German Airports 2

Your clearance to land in Germany - Landeerlaubnis

Aerosoft originally produced three German Airports add-ons for Flight Simulator 98 and they are being re-incarnated in reverse order for Flight Simulator 2000. This explains why German Airports 3 was released, followed by German Airports 2. This latest release is every bit as impressive as the first one they rejuvenated and we added it to the one we reviewed in Issue 4 for the full effect.

The software installs without any difficulty, however it was unable to detect the latest patch for Flight Simulator 2000 and offered to install that as well. The manuals recommend that the scenery is set to very dense and once this was done, no further work or selection was required. If you don't set the scenery complexity this way, you will miss out on much of the detail included in this expansion.

Positioning on the appropriate airport is enough to trigger everything into action. You are rewarded with the magnificent detail you can see in our screenshots. After landing at the standard airports in Flight Simulator 2000, you often feel as if you are taxing up to large boxes with standard bitmaps pasted onto them. You need to use a degree of imagination to boost the realism factor. This is not the case with German Airports, as you taxi in towards the terminals at Düsseldorf or Frankfurt Main, the buildings on the screen seem as large as they are in real life. You will feel like a small aircraft in a huge airport. The greatly increased level of detail on the buildings and the other traffic increases the visual cues and gives a much stronger impression of reality.

In addition to the high detail buildings, you will find the passenger walkways, working stand guidance indicators, people, trucks, baggage handing trolleys, pushback vehicles, pallets of cargo, blast fences, marker boards, follow-me vans and buses. Many of the buildings have signs on them declaring what they are, including the main terminal buildings which show the airport name. Approach some of the hangers, such as one of the Lufthansa Technik buildings at Hamburg, and the doors obligingly open for you to enter. Fly overhead and you will see some surrounding housing areas, trees, electrical pylons and even hot air balloons. The surrounding woods and villages are two dimensional, but look good enough from the airports. Many of the new objects found in German Airports 2 (but not in German Airports 3 with Flight Simulator 2000) move around, including the buses, which visit parked jets to collect the passengers (unlike some real airports we've used).

Ground vehicles add to the realism at Hannover

The payment for this extra detail is of course a drop in the frame rate, but this seems marginal. The performance was about 20 frames per second on a 950 MHz computer with GeForce2 graphics card, which is much the same as the standard Chicago O'Hare. This is partly because you have to use high detail to see the airports in all their glory. There were also a couple of glitches spotted in German Airports 3. The yellow lines painted on the ground for pilots to follow hovered just above the ground casting shadows, but that's minor and easy to ignore. The touchdown zone at Düsseldorf turned black when you got very close, as you can see from the screenshot. Both of these seem to be caused by scenery shadows, as they disappeared when the shadows are turned off. Apart from these, the software worked flawlessly.

Frankfurt with German Airports – and lo! all is revealed

Each package also includes a substantial number of Jeppesen plates for the airports to enable you to practice your approaches, departures and finding your way around on the ground.

Overall, both German Airports 2 and 3 are very good products and will hopefully encourage you to fly around a part of the world you could otherwise miss. They certainly make it worthwhile taxiing to the stand at the end of your flight. ■

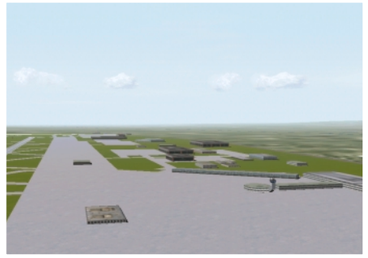
Stephen Heyworth

AIRPORTS INCLUDED IN GERMAN AIRPORTS 2

- Frankfurt Main
- Hannover
- Dortmund
- Cologne/Bonn
- Leipzig/Halle
- Munster/Osnabrük
- Paderborn/Lippstadt
- Kassel-Calden

AIRPORTS INCLUDED IN GERMAN AIRPORTS 3

- Düsseldorf
- Mönchengladbach
- Bremen
- Hamburg
- Kiel
- Lübeck
- Erfurt
- Berlin-Tegel



The original Frankfurt airport - not quite so impressive

The skidmarks on the runway at Düsseldorf suddenly turn black as you approach them. This can be cured by turning off the shadows

REVIEW SCORE:

Publisher:	Aerosoft	**Price:**	£19 approx.
Developer:	Thomas Hirsch & Peter Hiermeier	**Release Date:**	Out Now
Website:			www.aerosoft.com

At a glance: First rate scenery expansions for flying in Germany with Flight Simulator 2000 or 98, but may cripple frame rates on lesser machines. Minor problem with runway skid marks and taxi markings found at Düsseldorf, but easily cured.

SYSTEM REQUIREMENTS: PIII 400, 128Mb RAM, 16 Mb 3D graphics card

RECOMMENDED: PIII 550, 256Mb RAM, 32 Mb 3D graphics card

Flight Downunder 2000

Experience Australian flying at its busiest

If you tune an air-band radio to the frequency of a reasonable size airport, you will find the airwaves filled with the continual dialogue between ATC (air traffic control) and the planes flying to, from and nearby the aerodrome. Airports are hectic places, however when flying in Flight Simulator 2000 you can often feel very lonely as the only pilot in a silent, deserted world. Enter Flight Downunder 2000.

Flight Downunder 2000 adds a lot of realism to flying in Australia. Four elements make up this interesting offering. The aerodrome traffic zones are filled with traffic, the radio is constantly pumping out the chatter between ATC and pilots, several flight plans are provided and you are placed at the associated terminal departure points with your GPS loaded and ready to go.

At the hold waiting for two fighters to land

Flight Downunder 2000 doesn't always park you in the best position

Traffic is added to 32 airports and makes them very busy indeed. Some are so busy that you will have to be decisive and quick if you are to get airborne between the landing planes. It is a normal requirement for one plane to clear the runway before the next is allowed to land or take off, but you will have to break this rule to squeeze in. If you follow the planes on the ground, (a handy way of finding which is the active runway) you will find that they move in quite a jerky manner round the corners, not nearly as smoothly as those found at Chicago O'Hare in the standard Flight Simulator 2000 setup. As ever, add-ons always compromise frame rates on all but the fastest systems, so consider this when adding anything to Flight Simulator 2000. Shut down everything that you don't need in the way of background programs to go from 'slide show' to 'video'.

The type of plane you see is appropriate for the aerodrome, for example military airbases have formations of fighters flying in and out. When you approach an aerodrome, you will have to slot into the traffic pattern. This is easy enough where all the planes are light singles. However, when you are flying something fast, which needs lots of sky for manoeuvring, you can be frustrated by the sudden appearance of planes on the glideslope in front of you. Similarly, the dynamic scenery does not accommodate you by stopping at the holding point while you land. Other aircraft will merrily roll onto the runway when you are on short finals. It will keep you on your toes, but isn't exactly realistic (thank goodness!).

There are 24 airports with active radio communication, as well as a general flight service and an air traffic control centre. Tune in the correct frequency and you will hear the radio calls that provide a realistic enhancement to your flight experience. The voices are provided in a variety of quality from clear and easy to understand to crackly and indistinct. This is extremely accurate and you will need to train your ears to be able to understand what is being said.

The function of aerodrome ATC is to direct aeroplanes safely around the controlled airspace, and this is where Flight Downunder 2000 fails. The ATC chatter bears no relationship to your flight or any of the dynamic scenery movements. It is common to hear planes cleared to take off, look at the nominated runway and see that there is no plane there. The same happens with landings and all the other radio dialogue. Therefore, it is impossible to listen to the radio and work out the locations of the other planes, which is a key piloting skill. The ATC communications are reduced to a background sonic wallpaper which provides some atmosphere, but there is no point in listening to what is said.

The 40 pre-programmed flight plans are all linked to the GPS and will suit those who like to have the navigation done for them. You will be able to either follow the route on your GPS, or simply turn on the autopilot and relax until you reach your decent point. The plans we tried all worked out satisfactorily. The 'realistic passenger terminal departure points' seem to be purely positioning the aircraft close to the terminal buildings. Although the wording may imply that the terminal buildings are enhanced, we could not spot any differences from the default with Flight Downunder installed.

If the radio calls had been linked to the aircraft movements, this would have been an outstanding add-on. As this is not the case, the product is reduced to a localised dynamic scenery, with an interesting spin for antipodean enthusiasts and a good flight plan package. ■

Stephen Heyworth

REVIEW SCORE:			
Publisher:	The Interactive Multimedia Group Pty Ltd	**Price:**	£20.00 (approx.)
Website:	www.timg.com.au	**Release Date:**	Out Now
Developer:	The Interactive Multimedia Group Pty Ltd		
At a glance:	Lots of flight plans and dynamic scenery for your Australian flights, but background radio chatter that does not correspond to what you or other aircraft are doing.		
SYSTEM REQUIREMENTS:	Pentium 233, 32Mb RAM		
RECOMMENDED:	Pentium 233, 64Mb RAM, 3D graphics card		

DreamFleet 172

I have a dream!

It's not often that we find freeware files containing just a single aircraft and panel worthy of review. Yet here we are reviewing the latest release from DreamFleet, the Cessna 172, which makes two issues in a row for products from the Arrington and Betti team. This factor alone underlines the superb quality that they manage to achieve with each successive release.

The Cessna 172P has always been a popular choice for flying clubs and many commercial first officers will have started their flying careers on this aircraft. It has a very forgiving nature, the flight characteristics of an albatross, is relatively easy to get to know and above all is strong enough to take the punishment trainee pilots mete out. DreamFleet's rendition of the 172 is about as complete as you are likely to see. From the external view of the aircraft, courtesy of FSD (Flight Sim Developers), to the absolutely stunning detail found inside the cockpit, it's no exaggeration to say that they have extended the boundaries of flight deck design to another level. There's a new virtual panel view that greatly improves the in-flight aspect and gives the pilot a much clearer view of the runway on approach, in truth better than you get in the real aircraft. While in the virtual cockpit you can also use all the normal click spots to change gauge settings, a feature not available on most panels. When you switch to either left or right side views, a single click on the door handle will open the doors, accompanied, of course, by the appropriate sounds.

While we're on the subject of sounds, the 172 comes with a completely new sound set courtesy of Aaron Swindle and our own Mike Hambly. This includes a few firsts for Flight Simulator, such as the electric giro that can be heard spinning up once you turn on the master switch, or that distinctive clunk you get when you operate the parking brake. It goes without saying that you also get a complimentary set of engine sounds that include start-up and close down clips.

The aircraft itself is provided by Flight Sim Developers and is no less impressive. There's an attention to detail that extends to the cockpit interior, where you see a McDonald's meal and two cans of Coke on the floor next to the pilot. Externally, every control surface is detailed and fully functional, with the entire undercarriage members and aerial depicted as in the original aircraft. The inclusion of an authentic operational handbook and checklist scanned from the original documentation completes the package. Although it seems to be something of a cliché, this release does set the standard for others to follow and as DreamFleet flies from freeware to commercial developer, it could be your last chance to get this level of quality for the price of a (long) phonecall. ■

Joe Lavery

It's a little cloudy today, Sir – take care!

Who's that at the controls?

Note the captain's lunch on the cockpit floor – makes a change from the passenger's lunch after an aerobatic display!

REVIEW SCORE:			
Publisher:	DreamFleet 2000	**Price:**	FREE (if your phone calls are)
Developer:	DreamFleet 2000, FSD	**Release Date:**	Out Now
Website:	http://flightsimmers.net/airport/dreamfleet		
At a glance:	There are very few commercial products that achieve the quality of DreamFleet's offerings, it's a shame that this is the last freeware product we're going to see from them. If you're a light aircraft fan, you really must have this aircraft in your hangar.		
SYSTEM REQUIREMENTS:	PII 300, 128Mb RAM, 3D graphics card		
RECOMMENDED:	PIII 733, 256Mb RAM, 32Mb 3D graphics card		

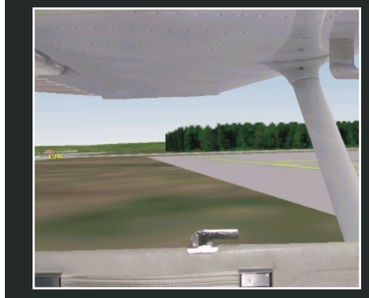
The business end of the new DreamFleet panel

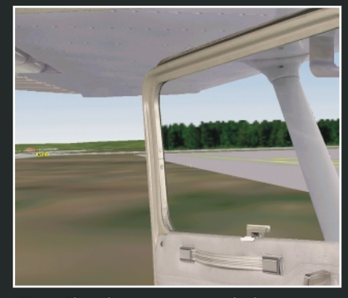
The main cockpit display

What excellent décor they have in this office

No much room in the back for your golf clubs

Open Sesame!





Even the doors open and close!

L-1011 TriStar

Still going strong after all these years

Detail in triplicate

Although Lockheed stopped producing civil airliners long ago, the L-1011 TriStar remains a firm favourite with its passengers and crews. This is said to be due to its quite advanced avionics that were way ahead of their time and the comfortable, roomy cabin. However, the need for a third crew member made it quite an expensive aircraft to fly, compared with the more modern jets that carried just two-flight crew. It also seems that the aircraft is a firm favourite with flight simulator pilots, who appear to favour the nostalgia afforded by aircraft types no longer in production.

We're pleased that Pilot's have listened to the flight simulation fraternity with this release. Realising that rehashed products are not acceptable, they have modelled the aircraft using multifaceted fuselages and engine nacelles, to make them more realistic. The liveries are painted with detailed quality textures, including separate night textures that sport illuminated tail sections and landing light reflections. They have even provided transparent cockpits with detailed interiors that show a life-like glow under low light conditions. In addition the engine turbine blades, undercarriage and control surfaces are fully animated, using authentic timings for the animations to take place.

It's obvious that the authors have done a great deal of work on the flight deck, in order to create a flight control interface that closely mimics the original aircraft. Included is an overhead panel, captain and first officer's panel, engineer's panel, INS (inertial navigation system) and radio/throttle stack. All these are activated from a row of custom switches positioned down the left-hand side of the cockpit.

A Tour of the Flight Deck

Starting with the overhead panel, you'll find operational switches for the anti-ice controls, pitot heaters, windscreen wipers and engine start sequences. There are many other systems depicted here, including the fire controls but like some of the operational switches, they are purely cosmetic and have no function within Flight Simulator 98/2000. This observation is common to all the panels but we understand that this is more a failing of Flight Simulator itself, rather than any lack of programming skill on the part of the authors. As you can see from our screenshots, the original panels were literally packed with dials and switches, which would be almost physically impossible to reproduce within the Flight Simulator environment. It's worth remembering that most Flight Simulator panels are designed with a measure of artistic licence.

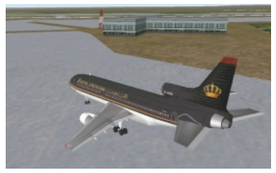
Moving on down we come to the windshield panel housing the controls for the aircraft lighting systems and the cabin announcement indicators. Directly below this is the main captain's panel containing all the primary flight instruments you'd expect to find, including the NAV1, ADI, HSI and AFCS panel. All the other panels follow the usual Flight Simulator convention and functions, the exception being the engineer's panel which displays the fuel flow system, hydraulic pressures and levels, electrical systems and the APU (auxiliary power unit) controls. This is quite a sophisticated and complex layout that underlines why the real aircraft carried a third crew member.

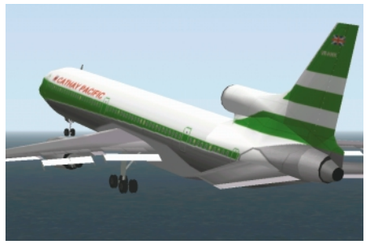
Having looked at the features incorporated into these panels, we should mention that the background bitmaps used are not up to the standard we've seen in some other (commercial) poducts. The hand drawn ones are obviously so and those derived from photographic sources look a little moth-eaten around the edges. Having said that, the main issue is whether they provide a realistic and workable experience and they do. In fact, you have to follow the correct procedures in order to start the engines or you stay on the tarmac. This begins with the initial start-up of the tank pumps, through the setting of a multitude of switches, on to activation of the APU and final ignition of the engines.

Heavy metal three piece

When it comes to flying the L-1011 we found the flight model to be stable, with that characteristic weight you get with a big jet (the ATC phrase of 'Heavy' certainly applies to this aircraft. You need to follow the correct takeoff procedures and almost coax the aircraft into the air. Those gung-ho pilots who simply slam open the throttles, heave back on the control column and hope for the best, will be forever running out of runway. Fly her 'nicely' and she handles beautifully. If you have a penchant for heavy metal, give the TriStar a look. ■

Joe Lavery

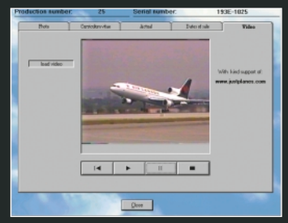


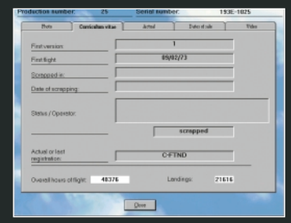


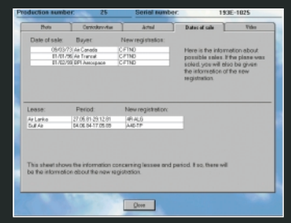
A tempting selection of the various company liveries depicted in the package

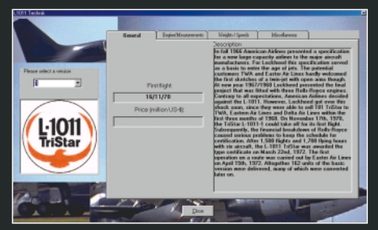
A COMPLETE ANTHOLOGY OF THE L-1011 TRISTAR

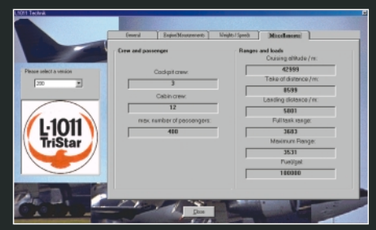
Although most aircraft add-ons include some form of background information regarding the subject they depict. Pilot's have gone one stage further by including a comprehensive historic database of technical information relating to the L-1011 TriStar, together with more specific data detailing individual aircraft. The database consists of over 250 Mb of data, accessed from a custom interface with two primary menu options, 'Curriculum Vitae' and 'Technical Data'. The first allows you to choose the specific aircraft you want information on, by reference to its serial, or production number. This provides another five options showing a photograph of the actual aircraft, a CV detailing its current status, the number of flying hours it achieved and in some cases the date it was scrapped. You also get information on dates of sale and registration, with an actual video of the aircraft itself, (although sadly the video element is limited to just eight individual aircraft). The other primary option 'Technical Data', is simply that... technical data detailing each variant of the TriStar.











REVIEW SCORE:			
Publisher:	Pilot's	**Price:**	£24.99
Developer:	Pilot's	**Release Date:**	Out Now
Website:	www.justflight.com		

At a glance: Pilot's have done a very reasonable job in portraying the TriStar variants and making them as challenging to fly as the real thing - although the cockpit representations do not reach the standards of some other commercial packages.

SYSTEM REQUIREMENTS: PII 300, 128Mb RAM, 3D graphics card

RECOMMENDED: PIII 700, 256Mb RAM, 32Mb 3D graphics card

THE COMPLICATED INSTRUMENT PANELS NEEDED TO CONTROL THE TRISTAR

Don't panic – this is normally a job for three people!

250 Cockpit

500 Cockpit

500 Cockpit and INS

500 Engineer's panel

500 overhead panel

A typical modern jet engine – this example might be a bit large for the office (or spare bedroom!)

Gas Turbine Engines

At Cranwell on the 15th May 1941, a 17 minute flight changed the future of aviation forever. Gloster Aircraft chief test pilot, Gerry Sayer, flew the E28/39 powered by Frank Whittle's new turbojet engine. Whittle had actually invented the engine in 1929 but due to lack of interest from backers couldn't even start testing an engine until 1937. Although Frank Whittle developed the first jet engine, a German engineer Hans Von Ohain designed and built a jet engine that powered the Heinkel He-178, which first flew on 27th August 1939. Interestingly, because the Germans kept this a close secret, the Italian Caproni Campini CC2 was credited with the first cross country jet flight from Milan to Rome in November 1941, although this aircraft had a piston driven compressor. The modern day gas turbine found on pretty much every military aircraft and airliner is the direct descendant of Whittle's fantastic invention.

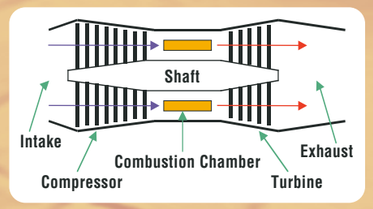
Sir Isaac Newton – partly responsible for a lack of pistons in modern airliners

There are four big advantages of gas turbines over piston engines. They can produce an enormous amount of thrust for relatively little weight and size. They can keep producing this thrust at high altitudes and high speeds, when the piston engine would have long given up. They are fuel-efficient, which is vital for the airlines. Last but not least, they are ultra-reliable. It's only at the relatively low power, low speed end of the aviation spectrum that piston engines still reign supreme.

Modern gas turbine engines can be split into two categories, those with propellers and those without. The principle of operation is the same for both. It is only the way in which the energy is converted to thrust that is different, as we will discover later.

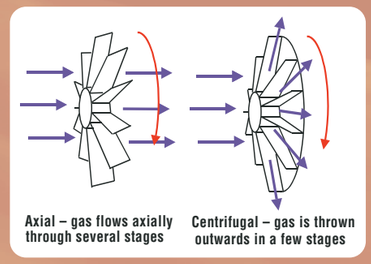
Speed is the key

The diagram below shows a simplified cross section through a gas turbine engine. As you can see they appear to have very little to them, and at a basic level they are extremely simple devices. But the devil is in the detail and the modern jet is pushing the boundaries of engineering science in many respects. For example, the flame burning inside the engine operates at about twice the melting point of the steel that surrounds it, and it is only by clever control of airflow that the engine survives.



Simplified jet engine

The principle of operation is that air, which is a gas, flows in through the air inlet and is compressed in the compressor. A shaft running through the central axis of the engine has the compressor mounted at one end and the turbine at the other. The air continues through a diffuser and into the combustion chambers, where fuel is added and burnt. This heats the air, which expands and pushes through the turbine and then continues out through the exhaust system. As the gas goes through the turbine it makes it rotate, which provides the power to drive the compressor via the central shaft. The same amount of air is entering and leaving the engine, but the air leaving is moving much faster, and it is this speed difference that provides the thrust.



Axial and centrifugal compressor stage

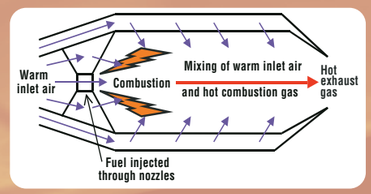
multi-bladed propellers in a row and each of these is called a 'stage'. To stop the air from spinning around the shaft after it has passed through the each stage, there is a stationary series of blades called stators. These stators also produce additional pressure by expanding the air. Each stage of the compressor increases the pressure of the air slightly so that by the time it is finally expelled from the compressor it can be up to 30 times atmospheric pressure.

There is a big problem with compressors called surge or stall. When the airflow becomes too small for the pressure across the compressor, the air flowing across the aerofoils can stall, just like a wing can stall. The normal airflow patterns in the compressor break down and the only way to cure it is to gently close the throttle. In some cases it may even be necessary to shut down and restart the engine. Stalling is most likely to occur at low engine speeds and slow movement of the power lever is generally recommended. Fortunately modern engine design minimises the likelihood of this being a problem.

Centrifugal compressors are a completely different beast. Instead of the air travelling axially (parallel to the shaft), it is taken in at the centre of the compressor and thrown out by the centrifugal force (for the purist, centrifugal force is a D'Alembert force). There are usually only one or two stages in a centrifugal compressor, and instead of having a stator, there is a diffuser to convert the velocity of the air leaving the rotor into pressure.

Combustion

Combustion chambers come in three basic types, the multiple can, can-annular and annular. They are all variations on the same theme, which is to split the air into two unequal proportions and burn fuel in the smaller part. About one fifth of the air is used to burn the fuel and the rest keeps things cool and dilutes the hot air from the flame. Temperature control is absolutely essential as the centre of the flame is around 2,000 degrees.


Warm inlet air
Combustion
Mixing of warm inlet air and hot combustion gas
Hot exhaust gas
Fuel injected through nozzles

The combustion chamber

You can experience a similar thrust when holding a hosepipe that is turned on at full blast. If you remove the nozzle from the end of the hosepipe, letting the water flop out, there is no noticeable thrust. But if you fit a nozzle that gives a high-speed jet, the thrust is very noticeable. The only thing that has changed is the speed of the water. This effect can be explained using Newton's third law of motion. Very loosely translated, it states that anything that pushes in one direction will itself get pushed equally in the opposite direction. With a jet engine the air is pushed backwards out of the exhaust system and the plane is pushed equally in the forwards direction.

Sharp intakes above the speed of sound

The intake on most modern commercial jets is very short and simple, whereas those on military jets often need to get the air to an engine buried inside the airframe. The first impression is that intakes simply direct the air from outside to the right place, but they are a little more complex than this. A modern compressor works best if the air enters it at about Mach 0.4. Most modern jet aircraft fly well in excess of this speed, and the intake has to slow the air down accordingly. In subsonic jets this is usually done by the divergent shape of the intake, just like a river widening out, the speed of the flow reduces.

It is a little trickier for supersonic jets because their engines still like the air to arrive below the speed of sound, and this is achieved by a clever use of shockwaves. A shockwave is a bit like the wave produced at the bows of a boat, except that it is invisible and forms in three dimensions. The relative speed of the intake air is reduced dramatically and efficiently across a few shockwaves, allowing the air to reach the compressor at the right Mach number. The clever part is getting the shockwaves to happen where you want them to be. Spikes (as found at the front intake of a Mig-21) or wedges (the side intakes of a Tornado) are usually used to produce the first shockwave outside the aircraft; movable baffles inside the intake control the rest.

Air intakes have a few other good tricks. They are often heated to prevent ice building up, which could easily be drawn into the engine and damage it. They can also blow a small jet of air forward and downward to prevent vortices forming between them and the ground during taxiing. The vortices would be like mini tornados sucking up debris from the ground. On the F-15 the intake wedges can pivot down by 14 degrees to give them good airflow into the engine when flying at high angles of attack.

Compressor

There are two types of compressor. On most airliners the compressor is axial flow, whereas many turboprops and helicopters have centrifugal compressors. Axial compressors are like a series of several

One of the most important functions of the combustion chamber and the nozzles used to spray fuel into them, is to ensure that the flame does not go out once it is lit. This may sound simple, but the flame has to be stable at any engine speed, altitude, temperature, airflow and fuel flow. The fuel must be atomised by spraying it into the combustion chamber. At low power settings, and hence low fuel flows, there could be a tendency for the fuel to come out of the nozzles as dribble rather than as the essential fine spray. Historically this could result in 'flame-outs', especially at high altitudes. Fortunately modern nozzles are designed to work effectively under all conditions.

Turbine

The gas (air and exhaust) leaving the combustion chambers is hot and moving quickly, in other words it has a lot of energy. The turbine is a bit like the compressor, as it is a series of moving blades and fixed stators. It works exactly the opposite way round, however, because the gas pushes through the turbine making it rotate. It's a bit like a series of windmills all on the same shaft. Typically the turbine has to remove about 60% to 80% of the energy in the gas just to drive the compressor. It is the remaining 20% to 40% energy that drives the aeroplane forward, either directly by the velocity of the exhaust jet (Newton's third law), or by absorbing even more energy in the turbine and using it to drive a propeller.

The turbine environment is pretty harsh with the gas entering at about 1,000 degrees, so hot that the turbine blades will be glowing red-hot. It is made worse by the shaft rotating at very high speed causing enormous tensile stresses in the blades because of the centrifugal force. This combination can result in turbine blade 'creep', which is when they slowly stretch. To give the turbine blades the best chance of survival, cooling air is often blown from the compressor through holes running up the centre of both the stator and rotor blades. As if this wasn't enough, the turbine blades have to be resistant to bending, thermal shock, fatigue, corrosion and oxidation. Life is tough for turbines!

Exhaust systems

If the gas leaves the engine too slowly, the thrust will be reduced. This would not be clever, because thrust is the whole objective of the engine. Therefore, the exhaust system is normally gently reduced in diameter to increase the exhaust gas speed. If the diameter gets too small, the gas will reach the speed of sound, at which point it will 'choke'. This means that no more gas can be squeezed through it. This is not all bad as there will be some beneficial 'pressure thrust'. Even so, the gas leaving the jet engine will normally be travelling at about the speed of sound. For a turboprop, of course, the exhaust thrust is far less important because the bulk of propulsion is produced by the propeller.

A special type of exhaust system is the 'afterburner' or 'reheat'. As you have seen, only a small proportion of the air entering the engine is used to burn the fuel in the combustors. Additional fuel can be injected and burnt in the remaining air inside the front of an extended exhaust system. This literally reheats the air by burning it after it has left the turbine, thereby giving it extra velocity, which in turn gives extra thrust. The outlet cones on afterburners are usually variable diameter to allow them to be narrow for normal operation and wide when the afterburner is being used.

Variations on a theme

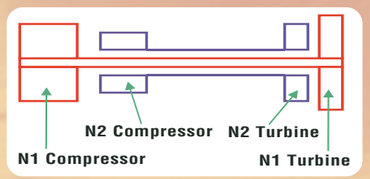
So that's the basic jet engine, however there are some very common variations.

Most engines have 'bypass' air, which is where a proportion of the output of the compressor bypasses the combustion chambers and the turbines completely. It mixes with the exhaust gas in the exhaust system, or in the open air behind the engine.

High bypass turbofan engines generally have the first stage of the compressor drastically increased in diameter to form a large fan. These can be up to about three metres in diameter and are called high bypass because about six times as much air is sent through the fan as will pass through the engine itself. These engines are very efficient and also tend to reduce the length of runway required for takeoff. The fans typically run at about 2,800 rpm, which means that their outer portion is running at supersonic speeds, and this is apparently responsible for the characteristic growl heard from these engines on takeoff. The turbine that drives the fan often needs to rotate much faster, so a gearbox may be fitted in between to reduce the speed.

The Learjet from Flight Simulator 2000 on the approach

It is difficult to design an engine that is ultra-efficient under all circumstances when everything has to rotate at the same speed. To cure this problem multiple shafts are used. The shafts are usually a series of tubes rotating concentrically inside each other. This means that the rear turbine drives the front compressor and the front turbine drives the rear compressor. Each compressor, shaft and turbine is called a 'spool' and has its speed monitored separately. The spool with the front compressor runs at speed N1, the next spool runs at speed N2, and so on.



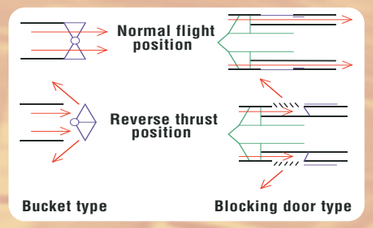
Two spool arrangement

Water, sometimes combined with methanol, can be injected into the engine to increase the thrust available during take-off, especially in high temperature conditions when the air is thinner. Water is normally added at the combustion chamber, but can also be added at the compressor inlet. It has two main effects. It allows more fuel to be burnt without exceeding engine temperature limitations and it increases the mass flow through the turbine, which directly gives more thrust.

Where the engine is driving a propeller, it is possible to have one turbine driving the compressor and another only driving the propeller. This is common practice and when it is done, the turbine driving the propeller is called a 'free turbine'. Whatever method is used to drive the propeller, a gearbox is usually necessary to reduce the speed of rotation.

Reverse Thrust

The desire for modern airliners to be as efficient as possible when cruising over long distances means that the wings are optimised for that phase of flight. To make the planes manageable on landing, all sorts of flaps and slats are fitted to the wings. Despite this, the landing speeds are still rather high and good braking is essential if the heavy planes are to stop within a reasonable distance. Although brakes are highly efficient, it is sensible to prevent them getting too hot by fitting reverse thrust.



Two common types of reverse thruster systems

There are two common ways of producing reverse thrust. The first achieved by a pair of 'buckets' or 'clam shells' that are moved in the way of the exhaust stream and deflect it back towards the front of the aircraft. For engines with bypass air, it is possible to use blocking doors to divert air from the compressor or fan out of the side of the engine, again back towards the front of the aircraft.

Turboprop aircraft usually produce their reverse thrust by angling the propeller blades into reverse pitch so that they blow the air in the opposite direction to normal.

Instrumentation

As with most things which are instrumented, some are used for control purposes, and some are used to monitor health. It is the same with jet engines.

The primary performance instrument for a gas turbine is usually either the EPR (engine pressure ratio) or the low-pressure spool speed, N1. As always, no instrument should be used to the exclusion of the others. It is quite possible to have the primary instrument reading correctly and still have engine problems indicated by one of the other parameters. For ease of reading and interpretation, the spool speeds usually indicate in terms of the percent of maximum rotational speed. You will see this on the 737 and Lear Jet panels in Flight Simulator 2000. An engine that exceeds 102% can often require some form of maintenance inspection and some engines are limited to a maximum time at high power settings, so be careful with your power levers.

The temperature of the gas passing through the turbine is critical to the health of the engine and the EGT (exhaust gas temperature) gauge measures this. Depending on where the temperature is measured, it may be called a TIT (turbine inlet temperature), ITT (interstage turbine temperature) or a TOT (turbine outlet temperature).

A fuel flow indicator and fuel pressure indicator are usually provided together with instruments showing the oil pressure and temperature. The temperature of the air entering the engine is also usually indicated somewhere and is used together with the flight manuals to set the correct levels of thrust. The level of vibration is a key indicator of the health of the engine as with any rotating equipment, if you see high levels it would be prudent to shut the engine down immediately.

Engine Controls

The main engine control is the power lever. This is used as you would expect, push forward for more power and pull back for less. The reverse thrust levers are usually mounted on the front of the power levers. Once the power levers have been pulled fully back, the reverse thrust levers can be pulled up and back over the power levers to activate reverse thrust (although without much success in Flight Simulator 2000). There are also a couple of valves for isolating the fuel, known as the low pressure fuel cock and the high pressure fuel cock. They are used during start-up, shut-down and emergencies.

With everything so hot in the engine, especially the combustion chamber, there is always the potential for unwanted fire. Vulnerable items are usually located in the cooler areas of the engine and as much as possible is made of non-flammable components to reduce the chance of a fire in the first place. But if a fire does happen, there are controls to operate the fire extinguishing system. These differ from plane to plane, however typically there will be an illuminated switch, one for each engine (and the APU, which is also a gas turbine). If the fire sensors detect a fire, the relevant switch lights up and an alarm bell rings. The switch is pulled by the pilot, which arms the extinguisher system and cuts off things like the fuel supply to the engine. If there really is a fire, a switch under the illuminated switch can then be pressed. This sends fire retardant to the appropriate engine, hopefully putting the fire out.

Hands on flying

Gas turbine engines are something of a paradox. The extremely clever designers make them simple enough to be ultra-reliable and very easy to control. Unfortunately, the result is that they are highly expensive, so if you have your heart set on flying gas turbine powered aircraft, there are usually only four ways to proceed. Take up flying for a living, get an extremely well paid job, win the lottery or fly flight simulators. If you choose the latter, like most people, try to avoid the temptation to use the power lever and ignore everything else to do with the engine. Always monitor all the engine instruments and be aware of what they mean. Remember, if you want your flight simulation to be realistic, always fly as realistically as possible. ■

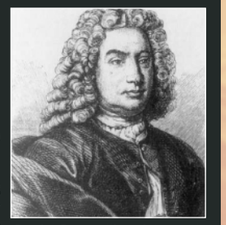
Stephen Heyworth

Bernoulli's Theorem

The ability to convert gas pressure into velocity and vice versa is fundamental to many aspects of flying. Bernoulli's Theorem is the mathematical formula often used to calculate this effect. It is quoted in many ways, but they are all the same, just rearranged.

P / D + v2 / 2 + h x g = constant along a streamline

Where
P = Pressure
D = Density
v = Velocity
h = height
g = acceleration due to gravity



Daniel Bernoulli – eighteenth century mathematician. Without his theorem the Rolls Royce Olympus would need propellers

Hence reducing the velocity increases the pressure. This is what a diffuser does. If you feel brave, try some numbers in this formula and see how it works. You can ignore the height for most aviation calculations. It's a bit more complex than at first appears because the density may also change, but holding that as a constant is enough for you to at least see how it works.

The 777 on approach at 140 and 150 knots – these show that the N1 (low pressure spool speed) is the more sensitive and the 'primary EPR is the same at both speeds, hence the N1 will give better control of the engine when setting the throttles

Get to know your engine settings for approach and life will be much easier for you

Lapwings Forever!

PC Pilot staff busy getting articles written to deadline (or possibly zooming over the landscape in a plane)

If sitting up in bed wearing a flying headset and navigating from Heathrow to Paris on your laptop is what turns you on, then your wife/partner is either asleep or very long suffering.

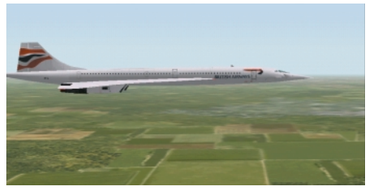
Flying on laptops has not had much press coverage. Maybe because all of us are so concerned with getting the latest and fastest processors and graphics cards, we simply do not consider the humble portable PC as the right platform for our obsession. In fact, if you are the kind of enthusiast who needs to have 3D graphics at 90 frames per second before even considering donning your headset and shades for takeoff, you won't get your LPL (laptop pilots licence). You won't find that performance yet on your average company take-away office machine. Well not this year anyhow.

But consider this: you're sat in a Boeing 747 flying from Hawaii to Vancouver. In front of you is a Time 300MHz laptop with Flight Simulator 98 installed and 128 Mb of RAM. It is 3am in the morning local time so naturally your mind is in top gear. Now on the way home from a round the world trip, you are flying in the cabin while the real pilot is vectoring the aircraft towards British Columbia. Try punching in the same aircraft, the same route and the same height that you're flying at and there's a lot of fun to be had. It can't beat the real thing but it's an improvement on just dreaming about it. Flight Simulator 98 works a treat on our Time laptop and it seemed to impress the lady flight attendant when we were in that 747 above Canada. Anything is better than that in-flight movie. The great thing was that when we crashed, the real aircraft didn't. What more can you ask?

We have installed Flight Simulator 98, Combat Flight Simulator and X-Plane on a laptop at one time or another and they all work well enough to keep us happy on a boring journey (although it's not recommended when you're driving a car). Pro-Pilot 99 installs perfectly and it flies well with decent views of the Grand Canyon as standard. Admittedly the frame rate suffers a bit and full-screen mode won't exceed (600x800) on some machines, but what do you expect?

In case you think we're odd and that no-one else uses laptops for flight simming, try searching the net for laptop simmers and you will be surprised at how popular the sport has become. There is even be talk of it entering the Olympics... well perhaps not. It also appears that some corporate flight simmers have refused to have their laptops upgraded to Windows NT or 2000 because their copies of FS98 won't fly on them any more if they do!

Everyone reports pretty good results using Windows 95/98 and Flight Simulator 98 or earlier. Dynamic scenery does not show too well, but frame rates are up in the 20s and 30s as a rule. Also it is fun to fly with a fingertip mousepad. The control is excellent once you get used to it. Try it for yourself if you don't believe us. If you have a good screen the images are fine without a graphics card, but it is helpful to turn off virus protection programs and anything else that usually goes on in the background. People have also reported that FS Traffic works well



A couple of screenshots to show that Flight Simulator 2000 really will run on a Dell 7000, but don't ask about frame rates

and does not seem to affect the frame rates on laptops. It seems that most laptops will support a flight simulator, but you probably need at least 300MHz and 64 Mb of RAM to make it worthwhile. The introduction of good graphics cards for the high end laptop market is set to revolutionise this area. Our Dell Inspiron 7000 has a 3D card and 15 inch screen, as well as a USB port that is useful for joysticks etc. We spent an interesting time at this year's Duxford Battle of Britain air show, demonstrating Combat Flight Simulator in all its glory to Blenheim Society veterans on this very Dell.

PC Pilot regular Kenji Takeda runs a Maxdata 400MHz laptop with 64 Mb RAM and a built in Silicon Motion Lynx graphics card. He finds that it runs Flight Simulator 98 well at 8-10fps providing the detail is set to low-medium. However it still won't run Flight Simulator 2000 above 2-3 fps, which is virtually unflyable. He isn't interested in joysticks, because as he says, the whole point of laptop simming is for those odd moments in airports or trains when you don't want to set out a whole array of stuff, but just sit anonymously and pretend you are writing your annual report to the United Nations Disarmament Committee.

Recently one of our desktop PCs had to go to hospital so we connected a Time Laptop to the normal 17 inch monitor and installed the Microsoft Sidewinder Pro Joystick. Add to that a new cordless mouse and you would think we had a great desktop setup. We can still enjoy the flying this way, which is better than none at all.

Yes, laptops are great for simming. They may not be cutting edge but you can get into your pilot persona anytime, anyplace. What is more if you are careful about how you sit, you can get a lot of credit for seeming to work overtime as you zoom up the Hudson river and barrel roll over the New York Stock exchange.

Now that's what we call working in the city! ■

Christopher Jarman

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Flight Sim 2000

FS 2000 includes new building textures, new advanced 3D building models, and a true elevation model of terrain. It also features an integrated flight planner with real Jeppesen navaid data, an updated weather system with advanced weather dialogue and the addition of new cloud textures and weather effects. Microsoft have updated the existing aircraft library by creating new textures for all its planes, both inside and out, also Concorde and Boeing 777 are added to the library.

4430B MS Flight Sim 2000 £42.99

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7609D Airline Simulator 2 £99.99

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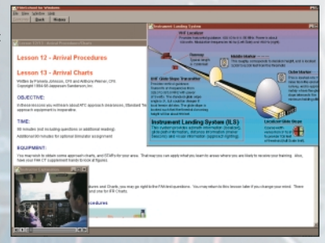
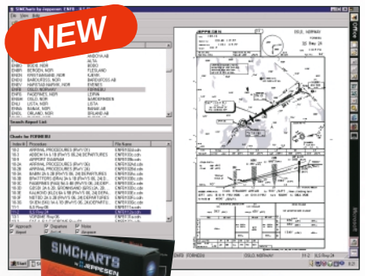
Flite Pro features; a Moving Map GPS, flight replay over Jeppesen approach plates, enhanced worldwide navigational map screens. The software provides screen panels for both the Cessna 172 & Bonanza A-36, rendered in super-realistic flight models taken from actual photographs. Large, easy-to-read instruments that look and react exactly like the real thing, even during simulated failures. Includes a world wide Jeppesen Nav-database, Victor and Jet airways, airspace and terrain depiction, city outlines, bodies of water, major roads and railways, airport information, navaid locations and frequencies, restricted airspace, country and state boarders and user defined waypoints. There is also a new route building feature which allows you to plan your simulated flight and up-load it to the GPS.



2069D Jeppesen FlitePro Software £89.95

Jeppesen SIMCharts



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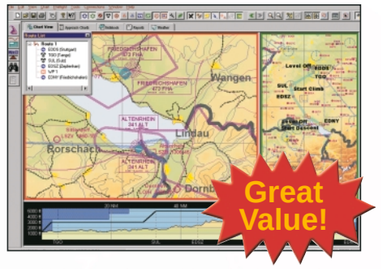
Jeppesen VFR FliteStar



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7611D RAF 2000 FS2000 Add-on £26.99

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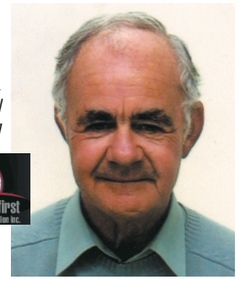


Our intrepid instructor, Richard Statham of Global First Flight Training

A casual look around the world of digital aviation will show that there's a lot of flight simulator software devoted to civil aircraft and thus to instrument and airways flying. Have you ever thought what the budding airline pilot has to do to get to the stage of being awarded what, in RAF terms, amounts to his 'wings' and in civil terms is a licence to fly as a commercial pilot? Did you know that the final hurdle is the CAA Initial Instrument Rating Test? Have you ever thought that you could, as you sit in front of your PC flight simulator, take that test? Many of you will have 'flown' an airways flight but do you know what you would have to do to take that nerve wracking and all-important IRT?

We asked Richard Statham, chief instructor for Global First Flight Training, based at Exeter Airport, to nurse us through this gruelling test. We've had to ignore some practical aspects like checking aircraft documents, walking round the machine, doing the engine run-up, etc. Instead, we've concentrated entirely on the flight considerations, taking you through the IRT requirements and, if you feel like trying it out, letting you see how you would get on if you had to do it for real. Just remember though, no autopilot because the CAA doesn't allow it to be used in the test (most light twins at training schools don't have them fitted anyway). However, bearing in mind the difficulty of flying some PC based simulators compared with the real thing – honestly, a real aircraft is much easier - you will probably have to use it for some of the time.

In case you wondered why it is called the 'Initial' IRT it's because it is your first and most important one and has to be done by a CAA Examiner.

The flight is conducted as if you were the captain and the examiner is just along for the ride. He will not help you in any way, except that he will act as safety pilot and warn you if icing conditions have or are likely to occur in which case you must take the appropriate action. There are apocryphal stories of examiners who refuse to pick up dropped documents but they are probably not true! The windscreen is entirely covered with screens and only a small window is left open for you to see out during the takeoff and this is closed almost as soon as you are airborne. The flight will be between two airfields not more than 150 miles apart and must take place wholly or partly in an airway. You may draw out your own flight plan for ease of reference if you wish, but you must carry all relevant airways maps and airfield approach plates for the area in which you are flying. All organisations with an AOC (air operators charter) will use Aerad or Jeppesen charts and either of these are the legal documents you must use. You may find yourself diverted for a number of reasons and woe betide you if you haven't got the relevant documents.

Assuming that all the correct pre-flight checks have been carried out, the airways clearance is requested, read back verbatim and departure clearance obtained. Once you're airborne the after takeoff checks are completed and the SID (standard instrument departure) carried out as planned unless ATC make any amendments. During the climb you will have to do various checks including icing ones which should be done at least every thousand feet. You then make a 'XXX levelled at…' radio call (where XXX is your flight number) as soon as you reach your assigned altitude and don't wait until you've got comfortable and sorted yourself out. The airway will then be joined and any changes in flight levels or radar headings given by ATC must be acknowledged by repeating the figures given. ATC will know from your callsign and flight plan that it is a procedural test and will not normally give you radar headings or assistance except for flight safety reasons. These days there is no need to make a position report unless asked to do so. ATC are aware of your

The Hawk Trainer, from the outside. This would certainly feel right at home in our garage

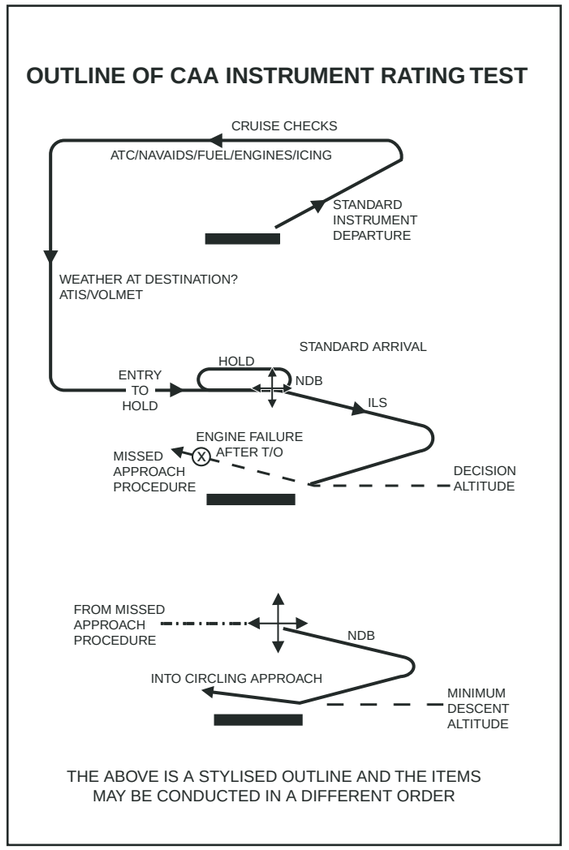
It all looks very cosy, but it's not the place to be with a silent examiner at your side and the wrong charts in your hand

position and route and the emphasis is on reducing unnecessary radio transmissions. During the flight you must make regular checks with the examiner that there is no airframe icing and failure to do so could cause you to fail the test. In the cruise there will be regular checks to be done to make sure all is well, that the navaids are correctly tuned for the current leg, the subsequent ones are anticipated and the fuel situation is okay. You must also check the weather at your destination well in advance using either the ATIS (automatic terminal information service) or VOLMET (continuous recorded broadcasts of weather conditions), ensure that it is within your limits and report this fact to the examiner. If it gets below your limits then you may need to divert, although under certain circumstances you are permitted to make an approach, so be sure always to have all airfield documents to hand in case that should happen. Note that you are perfectly entitled to refuse to take the test if you are in doubt about the weather conditions at either end. For example, if you thought that the wind was going to put you out of limits or the cloud base was too low. You will have to track both towards and away from a VOR (very high frequency omni directional range) during the flight and you must not use an NDB (non directional beacon) outside its 'protected range', normally 15-30 miles depending on the installation, although you are allowed to tune it in and identify it.

Your (real) aircraft will have two altimeters; both must be set to the airfield QNH (altitude above mean sea level) when you set off and the standby to the RPS (regional pressure setting) of the ASR (altimeter setting region) when you are in the cruise so you will have to note in advance which ASRs you will be flying in and check with ATC to find out what the relevant RPS is for that area. When you get to the destination and before you let down look on your airfield chart to find out the MSA (minimum safe altitude) for that airfield and tell the examiner that you will not descend below that until you are cleared to do so and you are at or approaching a navaid.

Having arrived at the destination via Standard Arrival, if applicable, you will have to join the hold using the correct procedure and carry out one hold (unless ATC require you to do more) using the NDB, not a VOR. On a PC flight simulator you're unlikely to do holds since these are simply a delaying tactic for air traffic purposes and with no other traffic on your simulator why do a hold? Entering and carrying out a hold in the approved manner is a subject in itself, as is tracking to and from an NDB on a specific radial. From overhead the NDB when cleared you will go into a two engined ILS (instrument landing system) down to DA (decision altitude). You must be properly established on the localiser before you start to let down on the glide path and if you are more than two dots out on either then you must go around and try again.

Having arrived safely and within one dot of localiser and glidepath at DA you won't be able to see the runway (the screens are still there, remember) and must announce to the examiner that you are 'going around', apply full power, climb to start the MAP (missed approach procedure) and report your intentions to ATC. At around 500-1000 feet the examiner will throttle back one engine, hiding the throttles so that you can't see which one and you will have to identify correctly the failed engine and take the appropriate actions. From now on the rest of the flight will be conducted on one engine although the 'failed' engine is not shut down but touch drills' only are used to simulate your actions and the 'dead' engine will be set to zero thrust by the examiner. Following the engine failure you must carry out the published MAP back to the NDB and then into a single engined ADF approach down to MDA (minimum descent altitude), with the emphasis on minimum. Should you go below that you will automatically fail that approach and will have to redo that part (cheque book time, as they say to the students). You are allowed to add 50 feet to the MDA to give you a buffer. Your MDA and DA are shown on the approach plates in the case of Jeppesens or additional green pages in the case of Aerads and you must have these figures in your mind or to hand before you start the approach.



Also, if you are not with ±5° of the published inbound track after the procedure turn is complete you may not descend until you are and you must retain this track within those limits for the whole of that approach down to MDA. This isn't easy, especially if the wind is strong. At around 1-2 miles the examiner may ask you where you think the airfield is in relation to you (guess and hope!) and when you have answered he will then remove the screens and you will carry out a circling approach to that runway, or perhaps another should it be more into wind.

At last you can relax and hope that you receive a smile from the examiner and get told that you've passed. Despite the perceptions of examiners they would much rather pass than fail you – happy news is so much nicer to give than bad. Perfection is not expected but competence most certainly is. If you make a mistake, don't panic, do whatever is the sensible thing to recover the situation. A pilot who panics is definitely not fit to carry passengers. So, if your NDB approach, definitely the most difficult item, becomes a dog's breakfast, start by telling ATC that you are going around and ask the examiner if you can do that again, which is what you would have to do in real life. A competent pilot is one who can dig himself out of the hole that he has dug. It is quite possible to get a partial pass and be required to retake, say, the hold again (quite common, we're told). It's a tough test but by no means impossible and almost everybody who sets out to take it passes in the end. Try it at home and see how you get on, although asymmetric flight may be outside the abilities of some simulators! ■

Richard Statham

Flight Sim Training

Professional instruction with Bill Stack

The charts used in these tutorials have been specially supplied and reproduced with kind permission of Jeppesen GmbH. These charts are NOT to be used for real-world navigation. They are for information ONLY. © 2000 Jeppesen GmbH.

BEFORE YOU START

A few prudent practices that professionals normally apply can make your flights as realistic as possible. The background about this tutorial will also help you enjoy flying while learning about it.

OUR FLIGHTS AND AIRPORTS

Cork, Ireland, will be our destination in this instrument tutorial from Heathrow Airport. The straight-line distance is about 345 nautical miles, and the direction is west. Our flight will last about ninety minutes.

Heathrow Airport (EGLL) is the world's busiest airport, depending which statistics you use. It handles more than 60 million passengers annually and covers over 200 international destinations. West of London, it has two east/west runways and one southwest/northeast runway. Light aircraft such as our Mooney Bravo would not normally use Heathrow, but we decided to take a liberty with this colossus to show what real pilots face when using it.

Handling more than 1.7 million passengers annually, Cork International Airport (EICK) continues to be one of the fastest growing regional airports in Europe. Opened in 1961, Cork Airport 'has facilities for passengers that are equal to, or better than most airports of comparable size in the world' according to its web site. It is served by Aer Lingus and British Airways.

OUR AIRCRAFT

With this flight being about twice as distant as our others so far and with many of our readers having the benefit of seven previous tutorials under their belts, we will graduate to a higher performance aircraft that can fly faster and cruise at higher altitudes. The Mooney Bravo is ideal for our purposes. It easily cruises at 195 knots and as high as 25,000 feet. With so little scenery to see through the clouds, we might as well fly the IFR version. All estimated durations in this tutorial will be based on this aircraft and we'll tell you a few things about flying the Mooney, in case you're unfamiliar.

THE CHARTS

Familiarise yourself with the Jeppesen charts used for these tutorials in advance. They show the respective flight paths, landmarks, airways, navigation aids. This preparation prevents having to study them during your flights.

USE FLIGHT PLANS

Be sure to lay out your trip on flight plans. If you don't use the automatic flight planner, use conventional paper flight-plan forms. Indicate all your navaids and fixes as well as your estimated fuel needs.

In lieu of filing your flight plan with ATC, as real pilots do, imagine that you have filed in accordance with regulations. Keep your flight plan handy throughout the flight so you can easily refer to it. After your flight, file it in a folder or loose-leaf notebook.

NOTE THE TIME

Jotting down the time of significant events during your flight is a good idea even though it isn't necessary when using the GPS (global positioning system). The GPS will show the estimated arrival times at fixes and the destination. Nonetheless, keeping track of your departure and estimated arrival times as well as the duration of each procedure is useful for knowing whether you are on time, late or early.

COMPENSATE FOR WIND

The winds we are using in these tutorials will alter your aircraft's course. Any deviation will consume additional fuel and delay your arrival. Refer to our issue 4 tutorial for a detailed explanation of wind compensation, the wind triangle and the calculation of wind-correction headings.

MONITOR YOUR PROGRESS AND STATUS

Throughout your flight, check your instruments for the status of your aircraft and instruments. In addition to monitoring your engine temperature and oil pressure gauges, be sure to monitor your fuel-flow and fuel-supply gauges. Also check your position frequently with GPS, radio navaids and/or time/speed/heading. The farther the deviation from course, the greater the total fuel consumption and arrival delay will be.

SIMULATE AIR TRAFFIC CONTROL

Our flight from London will take us through airspace congested with general-aviation, commercial and military aircraft of all sorts from smallest to largest and slowest to fastest. Real pilots flying in this airspace are under strict ATC guidance and must have clearances for just about every action. In lieu of ATC in your simulator, make yourself aware of the nature of this airspace and a pilot's relations with ATC while flying in it.

USE THESE TUTORIALS FOR SIMULATED FLYING

These tutorials are intended for computer flight-simulation users, not for real-world aviation or real-world flight training. While making our tutorials as realistic as possible, we have adapted them out of necessity to the limits and nuances of flight simulation, so some aspects cannot and do not apply to real-world flight.

REFER TO OUR PRIOR TUTORIALS

For space considerations, we will not repeat common aspects in every tutorial. If you don't have our previous tutorials, copies are available from PC Pilot – visit www.pcpilot.net for details.

OUR AUTHORS

Bill Stack is an expert flight simmer and author of several popular flight-sim books. Nels Anderson, our technical consultant, is a certified pilot and president of FlightSim.Com.

Learn more about flying like a real pilot from Bill Stack's five flight-sim books: http://www.topskills.com/flitsim.htm

FUEL ESTIMATION AND MANAGEMENT

ESTIMATING AND MANAGING YOUR FUEL

A large part of this tutorial will be the estimating fuel for the trip and managing its consumption during the flight. We will calculate the amount of fuel needed based on duration, legal requirements and fuel-flow rates for our aircraft. Then we will carry only that amount of fuel and fly the aircraft in such a way that fuel consumption is minimised. The ultimate objective is to arrive on the ground at Cork with fuel to spare. If we fall short, we might have to ditch in the sea.

Calculating fuel needs can be complicated, because fuel-usage rates vary with weather, altitude and flight conditions. For short, general-aviation flights such as this tutorial, simple estimates will suffice. Were we to fly more sophisticated aircraft for long distances over sparsely populated areas and especially in foul weather, our fuel estimates would need to be more precise.

Generally speaking, a Mooney Bravo uses about 16.5 gallons of fuel per hour from take off to landing. This figure is derived by dividing the specified range by the specified cruising speed. Of course, in every aircraft the fuel-flow rate is higher when climbing and lower when gliding and numerous other factors such as propeller pitch and density altitude affect fuel flow. Nonetheless, a fuel-flow rate of 16.5 gallons per hour will suffice for these tutorials.

With our 14-knot headwind, our ground speed will be about 181 knots instead of 195 knots. This means our 345-mile flight will take about one hour and 55 minutes. Consequently, we

FUEL ESTIMATION (CONT.)

will need at least 32 gallons of fuel to reach our destination.

Additionally, aviation regulations require aircraft to carry enough fuel to remain airborne longer than the estimated flight time. For IFR flights, we must carry enough fuel to reach an alternate airport plus another 45 minutes of flying. An alternate airport should be far enough from our primary destination to clear the foul weather that necessitates its use, while being close enough for general convenience. Shannon, is a suitable choice as an alternative to Cork. It's 55 miles north of Cork, so Shannon will take another 18 minutes, which will use about another five gallons of fuel at 16.5 gallons per hour. Add another 13 gallons for the additional 45 minutes (0.75x16.5=12.5).

All these calculations indicate that we need about 49 gallons of fuel for this instrument flight from Heathrow to Cork. Details of our calculations are shown in the table below.

CALCULATING FUEL NEEDS FOR MOONEY BRAVO

Step 1: Origin to Destination

345 miles ÷ 181 knots = 1.9 hours

1.9 hours x 16.5 gallons per hour = 31.35 gallons

Step 2: Alternate Airport Requirement

Distance to Alternate Airport ÷ Ground Speed = Duration

55 miles ÷ 181 knots = 18 minutes

Duration to Alternate Airport ÷ Fuel Flow = Additional Consumption

18 minutes x 16.5 gallons per hour = 4.95 gallons

Step 3: 45-Minute Requirement

Duration ÷ Fuel Flow = Additional Consumption

0.75 hours ÷ 16.5 gallons per hour = 12.4 gallons

Step 4: Total Estimated Fuel Consumption

Origin to Destination, 31.35 gallons +

Alternate Airport, 4.95 gallons +

45-Minute Requirement, 12.4 gallons

Total Estimated Consumption = 48.7 gallons

No regulations prohibit us from carrying more fuel than required, however, two practical considerations apply. First, most small general-aviation aircraft cannot carry the weight of passengers, full fuel tanks and full cargo holds, so pilots must evaluate their weight loads and decide whether to carry fewer passengers, less cargo or less fuel. When full passenger and cargo loads are required, the only option is to carry less fuel, which in turn, reduces the distance you can fly.

Secondly, fuel is expensive to buy, and aeroplanes use it many times faster than cars. Moreover, the extra weight reduces the weight that can be carried as passengers and cargo. So taking just enough fuel for the flight rather than full tanks is simply economic flying.

Monitor your fuel-flow rates and fuel-supply gauges throughout these flights. If your fuel is depleting faster than expected and it looks like running out, a refuelling stop at an interim airport will be necessary

FLIGHT SETUP

Prepare your simulator for your flight. It takes only a few minutes, and it makes your flight more challenging, more realistic and more fun.

SET UP YOUR WEATHER

For both flights, we'll simulate conditions that existed when we laid out these tutorials in late autumn. The scattered and broken clouds will necessitate instrument flight, while allowing some views of the scenery. Set your weather as shown in the table below.

Visibility:	3 miles
Wind:	14 knots from 220
Clouds:	scattered cumulus at 2,600ft MSL broken stratus at 9,000ft MSL few cirrus at 20,000ft MSL
Precipitation:	moderate rain
Temperature:	14C, 57F
Dew point:	12C, 54F
Pressure:	29.95 in (1014 mb)

You are free to fly during daylight or night conditions, because there is no practical difference for instrument flights. If you choose night flying, refer to our issue 6 tutorial for details. To make the flight a bit more interesting, you might try taking off before dawn so you will leave Heathrow in darkness and arrive at Cork in daylight, or vice versa.

PREPARE YOUR AIRCRAFT

Be sure to prepare your aircraft for flight before taking off by setting your radios and gauges and turning on your lights. The following conditions generally apply to most flights. Choose the Mooney Bravo, preferably the IFR version. All our time estimates are based on this aircraft. You are free to fly this tutorial in other aircraft later. We will take off from Heathrow's runway 23, because it most closely faces into the wind. Start your flight at this point.

SET UP YOUR AIRCRAFT

Take a few seconds to check your aircraft and be sure it's ready for today's flight. First, check there's enough fuel on board based on your fuel calculations. At these low elevations, your fuel mixture should be rich, and your propeller pitch should be low. If you have cowl flaps, open them fully whenever your engine is running on the ground to help cool the engine during low airflow operations. Keep them open during your takeoff and climbout. Be sure your carburettor heat is not on, because it won't be needed and it will reduce performance when you need the aircraft's best. The pitot heat won't be needed unless the temperatures are below freezing and there's moisture in the air. Check your outside-air temperature during your flight and turn on your pitot heat if needed.

As always, be sure to set your altimeter for local barometric pressure. Accurate altimeter settings are necessary for maintaining desired altitudes enroute and throughout airport operational procedures. For take off, the altimeter setting is whatever you entered in your weather menus when you established the weather for these flights.

Turn on the lights appropriate for this flight. The position lights and strobes are not required during day flight, but nothing is wrong with using them. Strobes are required except when their reflections from clouds would present a safety hazard to the pilot. Landing lights are recommended for taking off, landing and whenever below 10,000 feet above MSL (mean sea level). Even though use of these lights is not required, let's use them anyway.

TUNE YOUR RADIOS

Although you can rely largely on your GPS for Navigation, you still need your conventional radio navaids for airport operations and as a backup during the enroute portions. For the frequencies for each flight, consult our appropriate setup checklists. Set your Nav1 and Nav2 radios and your OBI for the first frequencies and radials you will use.

SET YOUR GPS

As usual, we expect our pilots to know how to use the GPS device in their simulators, that is, how to engage the device, change view screens, select data and so forth. If you don't know, check your simulator's manual for instructions.

Engage your GPS by displaying it on your screen. Then check the displayed course to be sure it reflects your desired flight path. Remember that it won't accurately reflect the SIDs, STARs or IAPs, so don't worry about them. Set the map for 'north up', 'course up' or 'track up', whichever you like best. We recommend using 'north up' for the instrument procedures, because that's how the procedures are published. Using 'desired up' during the enroute portion will help you recognise your position relative to the course and adjust it as needed.

PREPARATION CHECKLIST

Aircraft Settings

Engine:	running
Fuel supply:	adequate
Fuel mixture:	richest
Propeller pitch:	highest
Cowl flaps:	open fully
Wing flaps:	10% (specified by Mooney)
Carburettor heat:	off
Pitot heat:	as needed
Rudder:	straight
Ailerons:	neutral
Elevator trim:	neutral

Gauges

Altimeter:	local pressure
Amperes:	neutral
Vacuum:	green
Oil pressure:	green
Fuel pressure:	24 psi (specified by Mooney)

Radios

Nav1: 114.35 (Compton VOR)
Nav2: 113.6 (London VOR)
ADF: 352 (Woodley NDB)
OBI1: 105/285
OBI2: not needed for this SID
Com1: 118.5 or 118.7 (Heathrow Tower)

GPS

Map view:	on
Orientation:	as desired
Zoom level:	as appropriate
Plotted course:	as filed
Displayed:	as needed

Lights

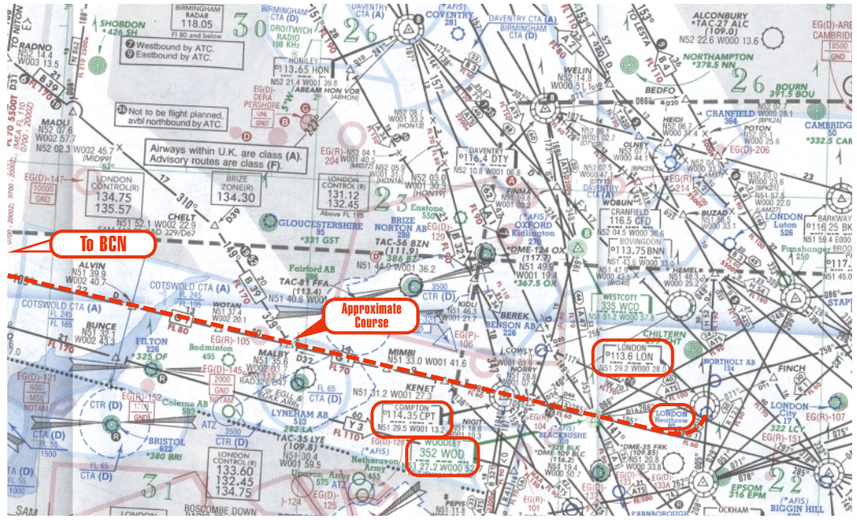
Beacon:	ON
Strobe:	ON
Position (navigation):	ON
Landing:	ON
Taxi:	ON

Clock

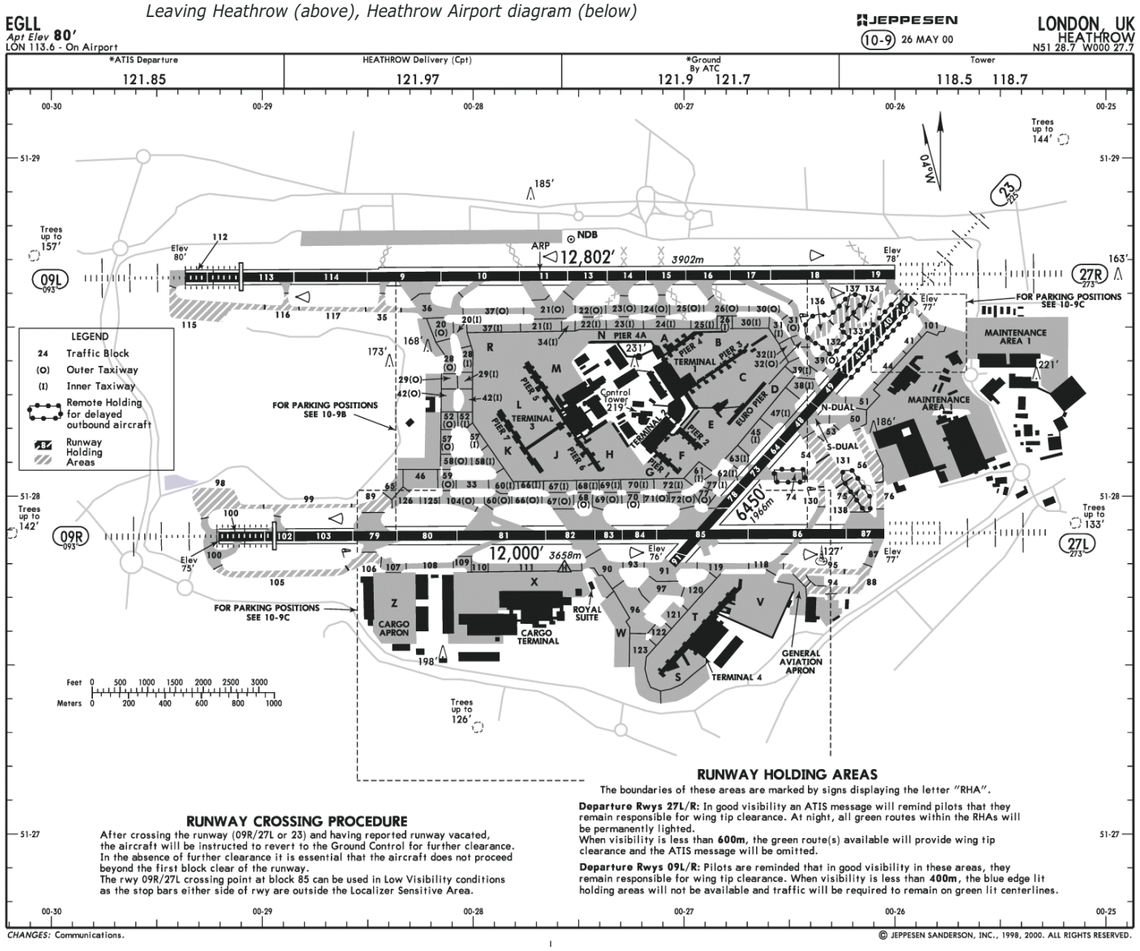
Local time or your choice

IFR (Instrument Flight Rules) Tutorial *Part 8*

London to Cork with a calculated fuel load



Leaving Heathrow (above), Heathrow Airport diagram (below)


EGLL
Apt Elev 80'
LON 113.6 - On Airport
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*ATIS Departure 121.85
HEATHROW Delivery (Cpt) 121.97
*Ground By ATC 121.9 121.7
Tower 118.5 118.7
LEGEND
Traffic Block
(O) Outer Taxiway
(I) Inner Taxiway
Remote Holding for delayed outbound aircraft
Runway Holding Areas
FOR PARKING POSITIONS SEE 10-9B
FOR PARKING POSITIONS SEE 10-9C
FOR PARKING POSITIONS SEE 10-9C
MAINTENANCE AREA 1
MAINTENANCE AREA 2
CARGO APPRON
CARGO TERMINAL
ROYAL SUITE
GENERAL AVIATION APRON
TERMINAL 4
Control Tower
TERMINAL 1
TERMINAL 2
TERMINAL 3
TERMINAL 4
NDB
ARP
12,802'
3902m
12,000'
3658m
09L/27R
09R/27L
RUNWAY CROSSING PROCEDURE
After crossing the runway (09R/27L or 23) and having reported runway vacated, the aircraft will be instructed to revert to the Ground Control for further clearance. In the absence of further clearance it is essential that the aircraft does not proceed beyond the first block clear of the runway. The rwy 09R/27L crossing point at block 85 can be used in Low Visibility conditions as the stop bars either side of rwy are outside the Localizer Sensitive Area.
RUNWAY HOLDING AREAS
The boundaries of these areas are marked by signs displaying the letter "RHA".
Departure Rwys 27L/R: In good visibility an ATIS message will remind pilots that they remain responsible for wing tip clearance. At night, all green routes within the RHAs will be permanently lighted. When visibility is less than 600m, the green route(s) available will provide wing tip clearance and the ATIS message will be omitted.
Departure Rwys 09L/R: Pilots are reminded that in good visibility in these areas, they remain responsible for wing tip clearance. When visibility is less than 400m, the blue edge lit holding areas will not be available and traffic will be required to remain on green lit centerlines.
CHANGES: Communications.
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For this IFR (instrument flight rules) trip from London Heathrow to Cork we will carry only the amount of fuel necessary for reaching our destination. If we miscalculate or use too much fuel, we might have to abort our flight or ditch into the sea.

READ YOUR CHARTS

The charts show the instrument procedure for all portions of our flight: 1) departing Heathrow, 2) flying out of the busy London airspace, 3) flying from London to Cork, and 4) approaching Cork Airport. Familiarise yourself with all relevant aspects of these charts before taking off so you won't have to fumble around enroute trying to figure them out. Note that some of the instrument procedure charts are not to scale, so the courses depicted on them are not precisely drawn. On these charts, follow the textual directions and use the graphical depictions for comprehension only.

Departure. For our departure from runway 23, we will use Southampton Two Hotel (SAM 2H). It leads aircraft to a point about 15 miles west of the airport. At the NDB named Woodley (WOD), we will join the airway to Cork. This NDB will be shown on the GPS map when this option is selected on the GPS device.

SAM 2H seems to call for two climb gradients, but it actually specifies only one — 243 feet altitude per nautical mile downrange until reaching 4,000 feet MSL. The table on the SID chart shows that at climb airspeeds between 75 knots and 100 knots (which fits the general-aviation aircraft we will fly) a climb gradient of 243 feet per nautical mile is achieved by a vertical climb speed of no less than 304 feet per minute.

The take-off procedure, routing and altitudes for SAM 2H are outlined in the table at the bottom of the chart. Look at the boxes labelled 'TAKE-OFF', 'ROUTING' and 'ALTITUDE'.

The chart also shows a left turn toward Southampton VOR, but we will head straight to WOD and join the airway there. The entire SID from take-off to Woodley NDB is about 15 miles and should last about 12 minutes. The enroute chart shows the airways, navigation aids and fixes we will use from between London and Cork. Basically, we will fly the G1 airway to Strumble VOR (STU), then the B10 airway to Cork. The G1 airway is 158 miles, and the B10 airway is 128 miles.

From WOD, we will fly a short leg to Compton VOR (CPT). Then we will fly a 77-mile leg to Brecon VOR (BCN), which is about 19 miles north of Cardiff. From BCN, we will fly 68 miles to Strumble VOR (STU), which is at Strumble Head in Pembrokeshire, just north of Fishguard. Upon passing STU, we will fly the B10 airway to 128 miles to Cork VOR (CRK), where we will join the airport's approach procedure.

The minimum enroute altitudes for these airways range from 6,000ft MSL over England to 13,000ft MSL over Saint George's Channel between Wales and Ireland. For westerly routes, IFR altitudes for headings between 180 and 269 are even numbers plus 500 ft, such as 6,500, 8,500 and 10,500 ft MSL, so we must maintain at least 6,500ft MSL when we enter the first leg of this journey. As we travel westward along this airway, we will need to increase altitude to stay above the designated minimums. If you fly this route in a larger, faster aircraft later, you may choose much higher altitudes.

Cork Airport does not use STARs, so we will join the VOR/DME approach to Cork runway 17, which calls for starting at CRK, then head 351 outbound to Cork NDB (OC), then continuing another three miles to a procedure turn, then heading 171 back to the runway. It shows the decision height, key waypoints, a holding pattern and the missed approach procedure, if needed. Be as familiar with this procedure as you can before entering it so you can use it smoothly.

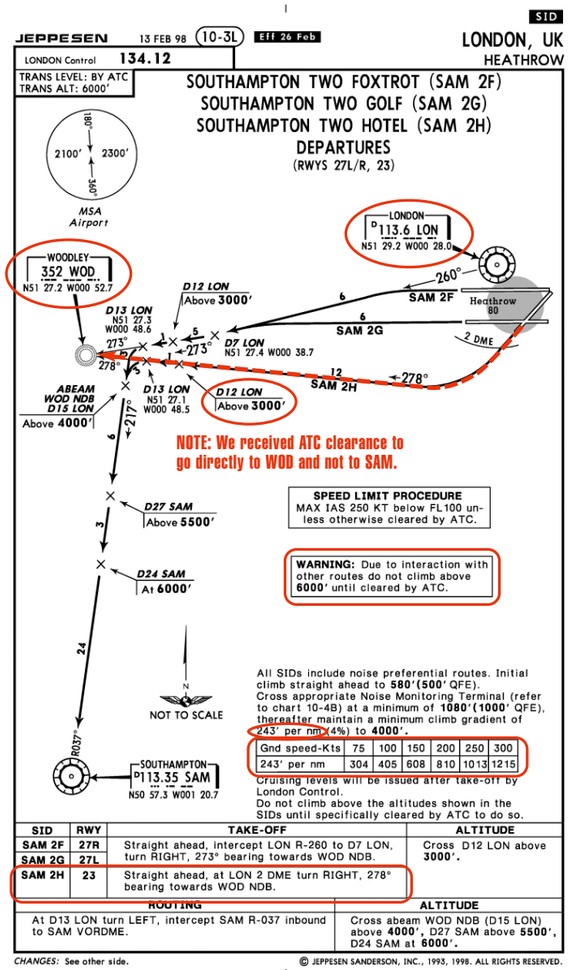
PLAN YOUR FLIGHT

Based on these charts, lay out the course you will fly from Heathrow to Cork. Include all the airways, navaids, intersections and fixes shown on the charts. If you use the electronic flight-plan feature in Flight Simulator 2000, you can include every navaid, intersection and fix along the route. Enter the following data, or have the planner choose them for you.

Departure: Heathrow Airport Runway 23
Arrival: Cork Runway 17
Alternate: Shannon
Waypoint: Woodley NDB
Waypoint: Compton VOR
Waypoint: KENET intersection
Waypoint: MALBY intersection
Waypoint: Brecon VOR
Waypoint: AMMAN intersection
Waypoint: Strumble VOR
Waypoint: BANBA intersection
Waypoint: Cork VOR
Altitude: 13,500ft MSL (at least)

Because the Flight Simulator 2000 flight planner does not support SIDs, STARs or IAPs, there are no options for entering any aspects of those procedures.

Although we're using the electronic flight planner, old-fashioned paper charts and flight plans are still useful for seeing our course and estimated times at a glance. Keep your paper charts and flight plans handy for quick reference.


JEPPESEN 13 FEB 98 (10-3L) Eff 26 Feb
SID
LONDON, UK
HEATHROW
LONDON Control 134.12
TRANS LEVEL: BY ATC
TRANS ALT: 6000'
SOUTHAMPTON TWO FOXTROT (SAM 2F)
SOUTHAMPTON TWO GOLF (SAM 2G)
SOUTHAMPTON TWO HOTEL (SAM 2H)
DEPARTURES
(RWYS 27L/R, 23)
MSA
Airport
WOODLEY
352 WOD
N51 27.2 W000 52.7
LONDON
113.6 LON
N51 29.2 W000 28.0
D12 LON
Above 3000'
D13 LON
N51 27.3
W000 48.6
D7 LON
N51 27.4 W000 38.7
SAM 2F
SAM 2G
SAM 2H
Heathrow
80
2 DME
ABEAM
WOD NDB
D15 LON
Above 4000'
NOTE: We received ATC clearance to go directly to WOD and not to SAM.
D27 SAM
Above 5500'
D24 SAM
At 6000'
SPEED LIMIT PROCEDURE
MAX IAS 250 KT below FL100 unless otherwise cleared by ATC.
WARNING: Due to interaction with other routes do not climb above 6000' until cleared by ATC.
NOT TO SCALE
SOUTHAMPTON
113.35 SAM
N50 57.3 W001 20.7
All SIDs include noise preferential routes. Initial climb straight ahead to 580'(500' QFE). Cross appropriate Noise Monitoring Terminal (refer to chart 10-4B) at a minimum of 1080'(1000' QFE), thereafter maintain a minimum climb gradient of 243' per nm (4%) to 4000'.
Gnd speed-Kts 75 100 150 200 250 300
243' per nm 304 405 608 810 1013 1215
Cruising levels will be issued after take-off by London Control.
Do not climb above the altitudes shown in the SIDs until specifically cleared by ATC to do so.
SID | RWY | TAKE-OFF | ALTITUDE
SAM 2F | 27R | Straight ahead, intercept LON R-260 to D7 LON, turn RIGHT, 273° bearing towards WOD NDB. | Cross D12 LON above 3000'.
SAM 2G | 27L | |
SAM 2H | 23 | Straight ahead, at LON 2 DME turn RIGHT, 278° bearing towards WOD NDB.
ROUTING | ALTITUDE
At D13 LON turn LEFT, intercept SAM R-037 inbound to SAM VORDME. | Cross abeam WOD NDB (D15 LON) above 4000', D27 SAM above 5500', D24 SAM at 6000'.
CHANGES: See other side.
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Our departure from Heathrow - SAM 2H

PREPARE YOUR AIRCRAFT

To make your aircraft ready for this flight, use our abbreviated checklist shown in our Flight Setup section.

TAKE OFF

Take off normally, including cockpit preparation and appropriate ATC clearances, as explained in our previous tutorials. Additionally, check your engine instruments. The manifold pressure should be at or above 38 and the oil pressure should be at least 24. The Bravo should lift off at about 60 to 65 knots.

Climb out at about 85 knots. During your climbout, adjust your cowl flap as necessary to keep your engine temperature in the green range – not too hot or too cool. Retract your flaps at about 90 knots. After your initial climbout, your Bravo should be able to climb easily at 700 feet per minute and 120 knots.

The prescribed take-off procedure is simple and straightforward. Climb no less than 304 feet per minute. Fly straight ahead along the runway 23 centreline until you are two miles from LON according to your DME. Then turn right and head 278 towards WOD.

DEPART HEATHROW

SAM 2H calls for simple manoeuvers. After turning right towards WOD, continue flying until you reach the NDB. You must be at an altitude of 3,000ft or higher when you reach D12 LON, which is 12 miles from LON according to your DME. You should reach D12 LON about eight minutes after taking off. This whole departure procedure from take-off to WOD is about 15 miles and should take eight to 10 minutes.

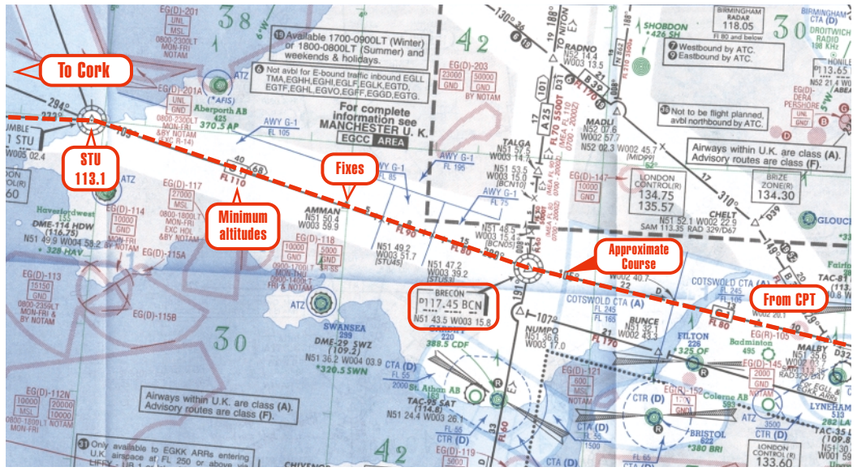
Notify Heathrow's ATC when you are leaving the their airspace.

JOIN THE G1 AIRWAY

When you reach WOD, join the G1 airway by turning right and heading 285 toward CPT. Notify enroute ATC that you are entering this airway. Jot the time that you enter the airway for your reference. Throughout this enroute portion of your flight, be sure to maintain your track along the airways and your altitude in accordance with specified minimums.

The chart shows a minimum altitude of 6,000ft MSL. You should be at or above this altitude when you enter the airway. If you haven't yet reached this altitude, continue climbing until you reach it.

Once you have entered the airway, you can engage your autopilot. Set it for each leg of the airway, or use the Nav1/GPS tracking feature, which will automatically change headings



Changing course at Strumble Head

from leg to leg. Set the altitude for the desired cruising altitude of 15,000ft MSL and a climb rate of 700 feet per minute.

After CPT, the minimum altitudes for the G1 airway steadily increase. By the time you reach STU, your altitude must be at least 13,000ft MSL. As you climb to these higher altitudes, your engine will behave differently. It will have less oxygen to breathe, so you will need to adjust the fuel mixture to compensate. If you don't, the engine will not perform well at all. The engine is performing best when the TIT (turbine inlet temperature) gauge reads 1750, so adjust the mixture until the TIT returns this reading. Do not exceed 1750, however.

You can conserve fuel by changing the propeller pitch at higher altitudes. We found that the Bravo cruises easily at 170 knots and uses 15.16 gallons of fuel per hour with the following engine settings: RPM 2,000, manifold pressure 30 and TIT 1300. Be sure your cowl flaps are closed whenever cruising. They are not needed, and they increase drag.

At KENET intersection, which is nine miles beyond CPT, the minimum altitude is 7,000ft MSL. This means your aircraft must be no lower than 7,000ft MSL when it enters this segment of the airway. Therefore, be sure you are at least 7,000ft MSL when you pass CPT.

At MALBY intersection, which is 23 miles beyond KENET, the minimum altitude rises to 8,000ft MSL. Be sure your aircraft is at or above this minimum when you pass MALBY. The heading for G1 changes slightly at BCN. When you get there, turn right four degrees and head 289 instead of 285.The minimum altitudes on G1 rise again at a fix 15 miles west of BCN, again at a fix eight miles later, and again at the AMMAN intersection. Be sure your aircraft is at or above these specified minimums when you pass these points.

If you are using your GPS, your intersections and fixes should be shown on the map. If your GPS does not show fixes, you will need to plot their position yourself using your DME. Looking ahead, we see that the B10 airway's minimum altitude is 13,000ft MSL. You'll need to be at or above this minimum when you enter this airway at STU.

CHECK YOUR FUEL SUPPLY

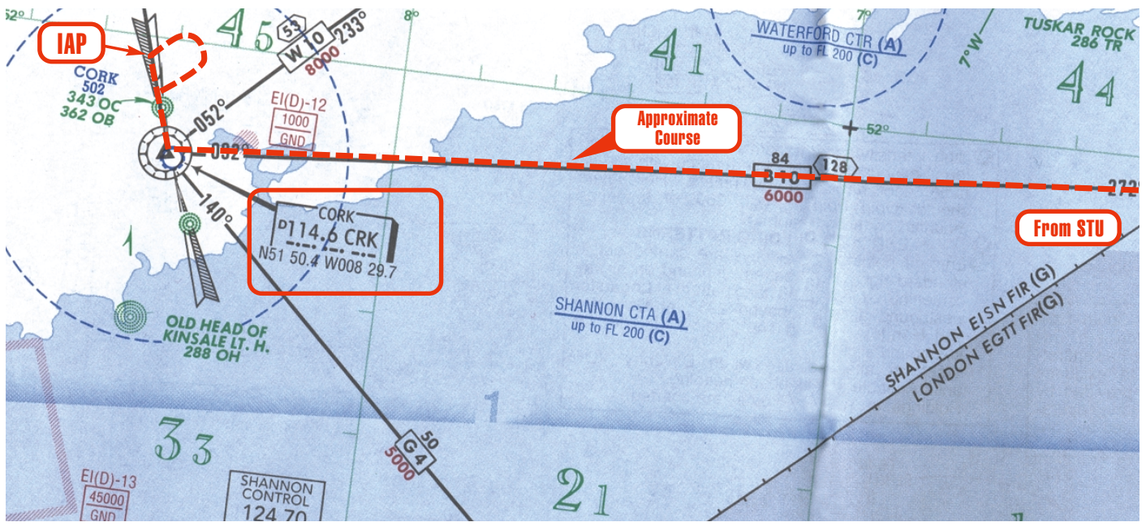
As you approach STU, you will also be approaching the west coast of Wales, because STU is right at Strumble Point. After STU, you will fly over the Saint George's Channel for 128 miles. Having met the alternate airport and 45-minute requirements when the flight began, you should have plenty of fuel to reach Cork, unless you made a mistake or you are leaking fuel. If you run out of fuel during this leg, you will have to ditch in the sea, so check your remaining fuel supply to determine whether you will have enough for the coming 128-mile leg over water.

Two considerations are necessary. First, the rate at which you have been using fuel is important, because it will be a clue as to how you will use fuel in the future. Second, the distance you can cover with the amount of remaining fuel consumed at the current rate will tell you whether you have enough to cross the channel. Granted, the descent portion will use fuel at a lower rate, but this is a fair basis for estimation. Use the same formula we used for estimating fuel needs in the first place (duration divided by fuel flow multiplied by available fuel).

If you have enough fuel to complete the trip, proceed. Otherwise, abort the flight and land for refuelling somewhere in Wales. The Flight Simulator 2000 GPS device lists emergency airports for your selection. Otherwise, choose one from the chart.

SWITCH TO THE B10 AIRWAY

When you reach STU, exit the G1 airway and follow the B10 airway to Cork by changing heading from 289 to 273. Notify enroute ATC that you are leaving one airway and entering the other. Your altitude must meet the charted minimum of 13,000ft MSL.



Approaching Cork

At BANBA intersection, which is 44 miles west of STU, the B10 airway's heading changes slightly from 273 to 272. You should reach this point about 19 minutes after passing STU. Make this slight change and then maintain a track along this airway. Also note that the minimum altitude after this intersection reduces from 13,000ft MSL to 6,000ft MSL. If we were passing through, we could maintain our 13,000ft altitude. However, we are planning to land at Cork, so we should begin a descent for landing.

Here is a simple rule of thumb for determining where to start a descent: subtract the desired altitude from the cruising altitude and then multiply the result times 0.003. The approach procedure entry altitude shown on the chart is 2,500ft MSL. By subtracting this altitude from our cruising altitude, we arrive at a descent altitude of 10,500 ft. Multiplying this figure by 0.003 produces a result of 39. This means we should start our 750 foot-per-minute descent to Cork when 39 miles away (13,000 – 2,500 = 10,500 x 0.003 = 39). Your CRK DME and your GPS will indicate when you are this distance from CRK.

Keep in mind that this is a simple rule of thumb and is not precise under all conditions. The aircraft's ground speed and descent rate affect the outcome. Nonetheless, this formula will place your aircraft at or about 2,500ft when you arrive at Cork VOR, which is the entry altitude for the Cork approach procedure.

During your descent, adjust your propeller and fuel mixture. Just as the aircraft will not perform well at high altitudes with low-altitude settings, it will not perform well at low altitudes with high-altitude settings. Mooney recommends a descent of 500 to 700 feet per minute, 2,400 RPM, peak TIT (1750) and manifold pressure no less than 15. Mooney also cautions against allowing the engine to get too cold and recommends using speed brakes during descents rather than low or zero power settings.

If you reach 2,500ft MSL before reaching Cork, maintain that altitude until the approach procedure indicates a lower altitude. If you are too high when you reach Cork, descend a bit more steeply or reduce your airspeed until you reach 2,500ft MSL.

ARRIVE AT CORK

When you are about 10 miles from CRK, you will enter the Cork airspace. Listen to ATIS on the frequency shown on the approach chart. Contact ATC on the frequency shown on the chart, and announce your intentions to land there. In lieu of ATC features, simulate these contacts yourself.

Adjust your altimeter for local pressure, turn on your landing lights, and check your fuel quantity again. If you are dangerously low on fuel, request emergency landing procedures from ATC. Otherwise, follow the prescribed approach procedures.

JOIN THE CORK APPROACH

The Cork approach procedure for runway 17 is simple. It first calls for flying over the airport at 2,500ft MSL, flying outbound at a heading of 351, then executing a right procedure turn, after which you head inbound for landing at a heading of 171. These procedures are very similar to those we followed in tutorial 5 at Glasgow.

At D7.0, which is 7 miles from CRK, begin your right procedure turn. Upon exiting the turn, you should be along the 171/351 radial inbound. When you reach D7.0 the second time, begin descending to 1,580ft MSL. The descent-gradient table on the chart shows that descent rates of 465 to 516 ft per minute are appropriate for aircraft travelling between 90 and 120 knots.

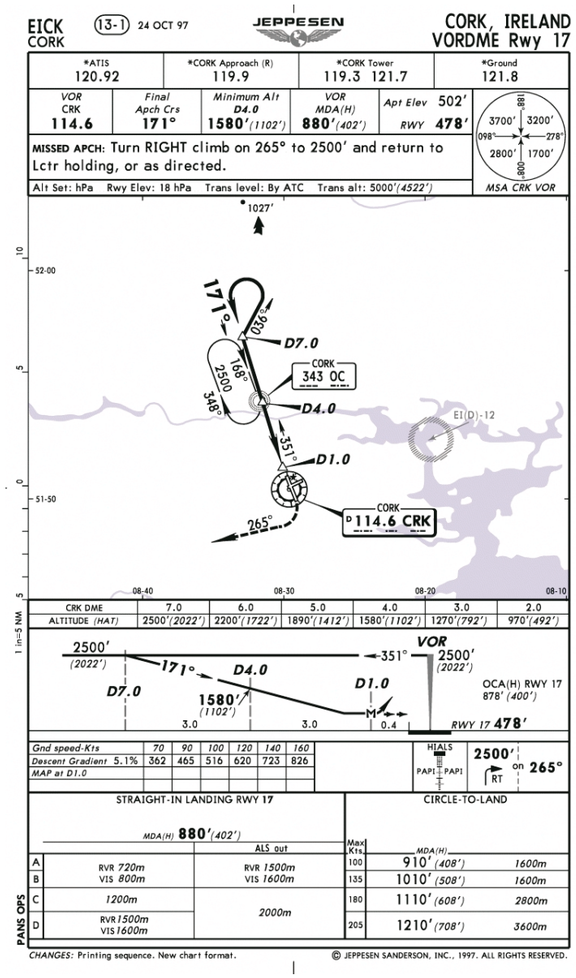
Use the Cork NDB (OC) to help you align the runway centreline by flying to this NDB, then adjusting heading as necessary to head 171 toward the runway. The crosswind will require constant adjustment of your heading to maintain track along the runway centreline. Our tutorial 4 explains landing in winds.

Mooney recommends full flaps down for landing approach, but they don't say when to lower them. We suggest lowering them incrementally as you pass the various fixes in the descent from 2,500ft MSL.

Be no lower than 1,580ft when you pass D4, which is four miles from CRK, then descend to the minimum descent altitude of 880ft MSL. You cannot descend below this altitude after passing D4 unless you can see the runway ahead of you and you are properly aligned for landing on it. If you meet this requirement, proceed with your landing. Otherwise, abort your landing and execute a missed approach.

LAND ON CORK RUNWAY 17

Land on Cork's runway 17 normally. Mooney recommends touching down at 75 knots and opening the cowl flaps upon touchdown. Exit the runway after landing, or your otherwise successful flight will be tarnished by a ground violation!



Our arrival at Cork on Runway 17

MISSED APPROACH?

If your position on final approach is unfavourable for landing, a missed approach is required. In addition to being properly aligned with the runway for a safe landing, the chart states that the runway must be visible from 880 ft MSL or 402 ft above the runway elevation of 478 feet. If these conditions are not met, you must execute a missed approach. Do not force a landing from a bad position, or you risk a hard landing that can damage your aircraft and/or injure its occupants.

The missed-approach procedure specified on the IAP for this runway calls for turning right, heading 265, climbing to 2,500 ft, then turning right again and heading to the locator holding pattern. In lieu of the ATC direction mentioned on the chart, fly to the depicted holding pattern and repeat the landing procedure from there. We explained holding patterns in an earlier tutorial.

CONGRATULATIONS

You have successfully flown enroute from one airport, over the sea to another by relying mostly on the latest navigation technology and correctly managing your fuel as a you would need to do on a real flight. Well done, indeed!

Keep flying this tutorial to build your proficiency. Apply stronger winds and turbulence and advance to more sophisticated aircraft to make it more challenging if you like. For more information about navigation and instrument flying, read Bill Stack's Flight-Sim Navigation and Instrument Flying for Flight-Sim Pilots available from www.topskills.com/flitsim.htm.

Bill Stack

THE *ONLY* HUB FOR VIRTUAL AIRLINES

At last! A VA that's more interested in enjoying their flying than boardroom disputes

Jersey Euro Link was started by Tony Madge (who you may recall wrote an article on police helicopter operations in the second issue of PC Pilot). His vision was for a virtual airline that was fun, did not require its members to fly set hours per month and operated with the minimum of fuss and rules. So popular has this format been, that it has resulted in four new companies forming to cater for demand. The Jersey Group of Airlines now consists of five companies each with its own identity.

(1) Jersey Euro Link. Operates scheduled passenger services linking Jersey to the UK and Europe.

(2) Jersey World. Operates scheduled passenger services from the London-Gatwick hub around the world.

(3) Jersey Cargo. Operates cargo services throughout Europe and the rest of the world.

(4) Jersey Sun. Operates holiday charter flights to many of the popular holiday destinations around the world with a fleet of specially painted aircraft.

(5) Jersey Scenic. The newest division, this operates an S61 helicopter and a number of classic aircraft such as the DC3, Heron & Rapide on routes around the Channel Islands and on sightseeing trips along the coasts of southern England and France. This is the division for you if you want a change from heavy metal and those glass cockpits!

With a strong and enthusiastic management team in place, prospects for the future look good. The Jersey Group of Airlines is being constantly improved and they are always looking for new pilots. If you are interested in finding out more, then visit their web site. ■

Derek Smalls

CONTACT DETAILS:
Tony Madge – CEO
tonymadge@yahoo.com
Website: http://members.tripod.co.uk/jeurolink

MORE VA'S AROUND THE GLOBE

WESTWIND VA
This VA boasts some pretty challenging schedules, with over 3,000 pilots in its ranks. If you're up for it they've got room for more pilots.
WEB: http://www.flywestwind.com

JERSEY GROUP OF AIRLINES
A VA group that includes Jersey Euro Link, Jersey Cargo Link, Jersey Sun and is described as "based more on fun and freedom than on regulations".
WEB: http://members.tripod.co.uk/jeurolink

BAHAMASAIR VA
Offers world-wide destinations in addition to extensive services in south eastern United States, Bahamas and surrounding Islands.
WEB: http://cybermoo.net/bahamasair

KTEAM FLYING GROUP
Not strictly a VA, but a flying team that go to fly-ins and tournaments with their aerobatics group. Well worth a visit if you can keep your lunch where it belongs when you're pulling 6G.
WEB: http://www.kteam.homestead.com/kteam.html

EASTERN VIRTUAL AIRLINES
A Virtual Airline that's been up and running since August last year and that now boasts over 300 pilots in their ranks, Eastern have real 757 and 767 pilots available to answer questions.
WEB: http://www.evair.com/index.htm

BRITISH AIRWAYS VIRTUAL
British Airways Virtual started life in April with the aim to make flying with a virtual airline both a rewarding and enjoyable experience.
WEB: http:// www.bavirtual.co.uk

TEXAS AIR CARGO
Texas Air Cargo operates out of the new Austin/Bergstrom International Airport at Austin, Texas.
WEB: http://www.geocities.com/texas_air_cargo/

VIRTUAL BRITISH CALEDONIAN AIRWAYS
VBCA is a virtual airline that is targeted towards the UK and European flight simmer.
WEB: http://avsim.com/hangar/air/vbca/index.html

POLAR AIR VA POLAR AIRWAYS
Hub based at Amsterdam Schiphol Airport (EHAM) and offices in Almere the Netherlands.
WEB: http://www.polarairways.com/

VIRTUAL DELTA AIRLINES
This site is primarily for the aviation enthusiast interested in airline operations, especially Delta airlines.
WEB: http://virtualdelta.cjb.net/

AIRKENT UK
AirKent is a VA from London. Currently operating the Airbus A320 family and BAe 146s from its main hub, Gatwick South Terminal.
WEB: http://www.airkentuk.co.uk/

VIRTUAL AIR COMMAND
Models itself on the real world US Air Force Air Mobility Command. Here you can fly all the big USAF heavies.
WEB: http://www.geocities.com/CapeCanaveral/Campus/6174/

VIRGIN SUN
Based at Birmingham International Airport, they operate from there as well as from London-Gatwick. They operate on flights to and from sunspots around the globe.
WEB: http://members.aol.com/Afre63456/vvs/

SUN CHARTER INTERNATIONAL
This is a new airline operating from the merger between BAC and SLI, within the UK to European resorts and across the Atlantic.
WEB: http://sun_leisure.homestead.com/index.html

MANCHESTER AIRWAYS VA
Manchester Airways is one of the UK's newest generation of Virtual Airlines. Its extensive UK network operates out of Ringway (Manchester).
WEB: http://www.wayne11.freeserve.co.uk/man/man.htm

60th HELICOPTER SUPPORT UNIT
A military style outfit that flies choppers in combat roles.
WEB: http://www.geocities.com/60thvaw/60thhsu/index.html

AIR JET UK
This airline claims to offer you a gateway to Virtual Airline flying.
WEB: http://www.flightsimnetwork.com/airjet/

EXCEL AIR
Serving Milwaukee, Daytona, San Diego, Denver, Dallas/Ft. Worth, Los Angeles, Atlanta, Boston, Washington DC (DCA), Minneapolis St. Paul, and Phoenix.
WEB: http://ourworld.cs.com/FlyExcelAir

VIRTUAL 2000
Currently they fly to more than 90 destinations in Europe. UK-based.
WEB: http://va2000.homepage.com/

UK FLY
A new VA set-up to run throughout Europe and across the world.
WEB: http://www.avsim.com/

SOUTH EASTERN AIRLINES
Opened in March 1999 and based at Hartsfield International Airport in Atlanta, Georgia
WEB: http://free.prohosting.com/~se-air/

ICELAND AIR
They fly to most of the major airports on the US East Coast, Canada, and Europe using real world routes, time tables and of course the correct fleet of aircraft.
WEB: http://icelandair.tripod.com/

ALASKA VIRTUAL AIRLINES
Based on the real world airline, Alaska Virtual Airlines and Horizon Virtual Airlines have one of the most realistic flight schedules found on the Internet utilising comprehensive flight schedules.
WEB: http://alaska_va.tripod.com/

AIR LINGUS
This airline is based on the real Air Lingus airline. A must for Irish VA participants.
WEB: http://aer-avensis.hypermart.net/main.htm

KNIGHT AIR
This VA has three hubs in the UK and an extensive worldwide route network. They come highly recommended by their members.
WEB: www.knightair.org

BRITANNIA VIRTUAL AIRLINES
This VA is based on the real Britannia Airways, with hubs at Birmingham, Luton, Gatwick and Manchester, they also fly from another 14 UK airports.
WEB: http://BritanniaVA.worldzone.net

HAWAIIAN AIRLINES VA
A slightly different VA as it's for PCs and Macs but ONLY using PS1 or X-Plane. With a maximum of 16 pilots worldwide Hawaiian is also pretty exclusive. Book him, Danno!
WEB: http://www.gorji.com/hawaii.html

EUROPEAN WORLD AIRWAYS
European World Airways is a new VA with hubs based at Heathrow and JFK. The Airline serves Europe, the Middle East and America, with their very own training facility.
WEB: www.europeanwa.cjb.net

SABENA VIRTUAL AIRLINES
Described as the 'official Sabena VA, working together with the real Sabena'. They have 30 pilots at the moment and have already won an award from Compuflight.
WEB: http://go.to/sabenava

AFRICAN EXPRESS (AFEX)
This is a VA operating a realistic and comprehensive network of schedules both within and out of Africa but based in South Africa. They're always looking for pilots so why not give them a look?
WEB: http://www.afex.co.za

WINGS INTERNATIONAL ALLIANCE
African Express, among others, are members of this group which is a collection of airlines from around the globe that allow pilots to fly just about anywhere whilst keeping things realistic.
WEB: http://members.xoom.com/wingsint

If you have a virtual airline that is not listed here, then please feel free to send in a short description to mail@pcpilot.net where we will endeavour to include it in a future issue.

THE *ONLY* BASE FOR VIRTUAL SQUADRONS

"There's none so rare , As can compare , To the boys of 614 AC"
RAF squadron song - to the tune of 'Old King Cole'

Similar in principle to Virtual Airlines, fans of combat flying will be pleased to learn that Virtual Squadrons also fill the simulated skies. Virtual Squadrons can be found for all of the combat flight sims that are flown online. Some fly on only one sim, whereas others operate across software barriers. The Virtual Squadrons featured here all fly World War II Fighters, by Jane's, on the Jane's Combat Net site, www.janes.ea.com .

Virtual Squadrons mainly take their titles from the famous squadrons of the Second World War, with many of them forming tight links with the veterans associations of the real unit, that they seek to commemorate. Several veterans actively help to develop the web sites of some Virtual Squadrons.

The members of Virtual Squadrons aim to conduct themselves with the highest levels of behaviour and chivalry at all times whilst carrying the squadron title, as a measure of respect for the aviators who flew in the real units.

Some Virtual Squadrons give pilots a free range of aircraft to fly, whereas others stipulate a range, such as 'Allied', in order to maintain a historical perspective. Virtual Squadrons possess no political ideologies – flying for a particular unit does not mean that you hold the same views that they would have done in the 1940s.

Virtual Squadrons benefit their members in several ways. They provide training and advice for less experienced pilots, with set training schedules that pilots are required to attend. Team missions are organised and tactics discussed. Being a member of a Virtual Squadron enables the sharing of information between pilots to be easier, with details of patches, sites, and other meeting places mailed to members.

Competition between squadrons exists, when one squadron declares war on another. A tally is built up, as pilots are either 'killed in action', or made a 'prisoner of war', by successfully bailing out. The winning squadron is the one that has pilots left.

Rookie pilots flying at the 'Jane`s Combat Net, WWII Fighters' site

are always welcome, and advised to visit www.helponwings.com. This site is dedicated to help you find your way round Jane`s World War II Fighters. It's full of tips, patches and the 'Rules of Engagement' for online flying. A very useful section details how to fly each plane available. Another useful site for pilots of WWII Fighters is www.dogfighter.com where downloads of skins, missions and patches can be found. ■

Adrian Pitman

MORE SQUADRONS AROUND THE GLOBE

Jagdgeschwader 27 `Afrika`
Virtual Squadron JG27 takes its title from the somewhat nomadic Luftwaffe fighter squadron of the Second World War. The Berlin based squadron performed well in France and the low countries, before shipping to North Africa, where its most famous ace, Hans-Joachim Marseille rose to fame. The squadron ended the war, back where they began, defending Germany.
WEB: http://jg27.homestead.com

9th Fighter Squadron
This Allied squadron takes its name from the unit of the same title, which saw combat throughout the Southwest Pacific campaign during World War II. Fourteen aces served with the 9th, including Major Richard Bong, the top scoring American ace of the war. The `real` 9th Fighter Squadron fought through Korea and Vietnam, before converting to the F-117A Stealth Fighter in 1993.
WEB: http://geocities.com/theflyingknights/9th.html

203rd Fighting Phoenix
Having only recently formed, the 203rd Fighting Phoenix is fast becoming a formidable unit. Pilots are selected for their attitude as much as for their flying ability, with heart, determination and teamwork being the pillars that this Virtual Squadron is built upon. Aircraft choice is free, with the Spitfire being the most popular mount.
WEB: www.geocities.com/pheonix_ww2f/1.html

663 RAF-VFS `Black Tigers`
This is one of the oldest and largest squadrons flying on JCN. Although predominantly a Spitfire squadron, choice of aircraft is free. In additional to the usual dog-fighting and training, 663 has its own dedicated formation flying team!
WEB: http://www.triadntr.net/~663tiger/BlackTigers.html

Virtual Squadron 322
Formed in 1999, VS No.322 is based on, and dedicated to, the wartime RAF Dutch Spitfire Squadron. After the war No. 322 was incorporated in the Royal Dutch Air Force, with F-16 pilots of No. 322 performing outstandingly in the Kosovo crisis. Choice of aircraft is free, with the primary objective of the VS No. 322 being to "have good fun over the internet, in a team environment"
WEB: http://home.wish.net/~sebast/sq322.htm

JG88 `Condor`
Named after the famous Condor Legion squadron of the Spanish Civil War, this is another newer VS, that is rapidly making a name for itself. The pilots are predominantly Norwegian, although membership is open to all. The choice of aircraft is restricted to Axis, with the favourite aircraft being the FW190.
WEB: http://home.no.net/kondor

1st Volunteer Group
This non-aligned VS is responsible for producing the excellent `Help on Wings` site, mentioned previously. The squadron was formed primarily as a way to help other JCN pilots, at a time when some VS were closing down. Aircraft choice is free, with squadron membership limited to 25 pilots.
WEB: www.ftwing1vg.com
WEB: www.helponwings.com

JOG "Joined Online Gaming" Clan
This non-aligned squadron participates in all the WWII simulations, on both land and in the air, with a free choice of both side and aircraft. Their latest participation on an online WWII flight simulator is CFS2, and they are waiting for IL-2 Sturmovik.
WEB: http://fly.to/theJOGclan (Clan-site)
WEB: http://fly.to/WARPLANES (Gallery-site)
WEB: http://www.myleague.com/ww2fight (Ladder-site)

78th Virtual Fighter Group
The 78th VFG is very closely aligned with the 78th Fighter Group Association, (veterans organisation), of the 8th Army Air Force, who operated from Duxford during World War II. The veterans designated the 78th VFG web site as their 'official' home page, and close links are maintained between both real and virtual pilots. As such, the 78th VFG feels very honoured with its association with the 78th Fighter Group vets.
WEB: http://www.78thfightergroup.com/index.html

If you have a virtual squadron that you want to tell other readers about, please feel free to send ina short description to squadrons@pcpilot.net and we will endeavour to include it in a future issue.

Downloads

free to a good home with a free phone

We present another collection of top quality files gleaned from the Web, but this month some of them were recommended by our readers. See if you agree with their opinions and don't forget to send us a mail with the location of any outstanding files you want to share. Freeware developers - don't be left out. To get your download considered for a PC Pilot cover CD, send an email to disc@pcpilot.net with details of what you've designed, and where we can find it and we'll get you immortalised forever on acetate. Don't worry – we won't pass your pride and joy to the Dark Lord of cowboy publishers.

Flight Simulator 2000 Aircraft

Piper J-3 Cub

There's no doubt that the Piper Cub is one of the most successful and versatile light aircraft ever produced. It has been used as a trainer for many of today's pilots who found its docile handling characteristics safe in almost any situation. The authors have certainly reproduced that in their model, which not only looks good but provides an aircraft that is fun to fly without worrying too much about instrumentation.
Author Designer: Manuel Medel; Flight Dynamics: Steve Small; Panel : Yannick Lavigne; Sounds: Aaron Swindle.
Download From: www.avsim.com
Filename: piprj3mm.zip

MBB BO105CBS

Ian Steadfast has produced another outstanding helicopter for FS 2000 users, modelled on the MBB BO105CBS used by Wiltshire County Police and Ambulance services. It comes with its own dedicated panel and sound set but like most helo types, needs an experienced hand to fly it successfully. The visuals both inside and out are superb, with photorealistic textures and transparent windows that show the pilot.
Author: Ian Standfast
Download From: members.aol.com/eitht777/helipad.html
Filename: bo105wp.zip

Fairchild CC-119 Packet – 'Flying Boxcar'

This aircraft was Fairchild's answer to heavy air transport. Initially designed in 1941 as a C-82 Packet troop/cargo transport, it was taken on in strength as a redesigned CC-119 in 1957 for the RCAF Air Transport Command. The aircraft has full moving parts and opening 'clam-shell' doors at the back. The author mentions that this is his first attempt at aircraft design… we can only say… "Keep em coming!"
Author: Dean Reimer
Download From: www.flightsim.com
Filename: rcafc119.zip

Flight Simulator Design Studio Lockheed F-16C Fighting Falcon V1.00

We knew that the release of FSDS would provide us with some excellent aircraft models and here is one of the first to filter through. This F16-C features maximum moving 3D parts and superb photorealistic textures. The author has also taken some trouble to ensure that the flight model is as good as the visuals.
Author: Giuseppe Chiacchietta
Download From: www.flightsim.com
Filename: fsdsf16c.zip

F/A-18c Hornet 'Blue Angel' (full package)

We have another American fighter aircraft from a collaboration of some of the best developers around. It is a complete F/A 18c package that features an aircraft from the Blue Angels aerobatic team, with FS2000 dynamics, panel and sounds. The model has retracting landing gear, flaps, and arrestor hook with working nav, strobes, formation lights and shows a vapour trail in flight. The working cockpit uses Full Cockpit, Heads Up, and Heads Down sub panels with muliple MFD's, FS2000 GPS, Fuel computer, 'Pull up' warnings, and an INS system. There is also HTML documentation included.
Author: John J Schumacher/Schu Engineering
Download From: www.flightsim.com
Filename: se-f18a.zip, se-f18b.zip, se-f18c.zip

P-47D

Roger L. Dial has provided us with lots of WW2 fighters over the past few months. We bring you another superb fully animated model this month, based on the P-47D originally flown by Lt. Col. Don Archer out of the 48th Fighter Group, 493rd Fighter Squadron during WWII. Roger has once again produced an exceptional aircraft, both in its external look and flight model.
Author: Roger L. Dial "Airbuddha", Flight model by Bruce Thorson
Download From: www.thehangar.dogfighter.com
Filename: Abd-P-47D Winnie.zip

B-25B Mitchell Medium Bomber

Yet another aircraft from Roger L. Dial this month, this time he moves to a bomber squadron with a North American B-25B Mitchell, called 'Ruptured Duck'. The aircraft comes with the usual Roger Dial refinements with the exception of a panel which Roger tells us was lost when his hard drive gave up the ghost, to the sound of many expletives we're sure. All crewmembers are depicted and can be clearly seen through the Perspex in the cockpits. The model has working bomb bay doors by use of the spoiler key, the engines belch smoke on startup and there are Pin-up girls behind the bombardier... yes, really.
Author: Roger L. Dial "Airbuddha", Flight model by Bruce Thorson, Sound by Mike Hambly
Download From: www.thehangar.dogfighter.com
Filename: Abd-B-25B.zip

Utilities for Flight Simulator 98/2000

Hangar Manager 2.0

Hangar Manager is a utility designed for FS98/2000, which allows you to easily add a package (any combination of an aircraft, panel or sound configuration) to the 'hangar' (your collection) by selecting the zip file it's contained in. It is essentially a storage utility for all your FS add-ons, you can quickly and cleanly copy and remove packages to and from the Flight Simulator directory.
Author: Mark Schilberg
Download From: www.flightsim.com
Filename: hmv20.zip

Panels for Flight Simulator 98/2000

USAF F-16 Falcon Panel

We chose this new panel to go with the superb F-16C designed by Giuseppe Chiacchietta also reviewed this month. It features both Green and Red HUD gauges, working MFDs, ARC and ROSE HSIs, parking brake and STALL warning lights, panel switches, 'pink' night lighting, correct HUD compass calibration and gear indicator lights. This version adds a left MFD view for system status, and incorporates the FS2000 GPS.
Author: Paul Schwerdtfeger
Download From: www.flightsim.com
Filename: f16pnlv2.zip

Bombadier Dash8-Q400 Panel

The Q-400 is the latest in the Dash8 regional turboprop lineage. It departs from the other Dash8s in that, among other things, the panel uses CRTs instead of analogue gauges and has a cruise speed of 350 Kmh. The panel was designed from photos of a real Q-400 panel, and contains two versions, one using the shareware 'Real CRT' gauges from Tony D'Ambrosio, and one with all freeware gauges.
Author: Scott Thomas,(ibuild@prodigy.net) and David Ramsey
Download From: www.flightsim.com
Filename: q400pnl1.zip

Scenery for Flight Simulator 2000

Toulouse-Lasbordes Airport LFCL

Toulouse-Lasbordes Airport is a little non-commercial airport located within the southeast boundary of Toulouse. The detail of this scenery area is approaching the quality of that found in packages like Airport 2000. With every building, sign, fence, fuel area and associated object included in the package. These are very well designed and complete with night time illuminations, the author also depicts the Aéro-club Toulouse Midi-Pyrénées alongside the tower.
Author: Patrick Castay
Download From: www.flightsim.com
Filename: LFCL1.zip

Palma de Mallorca, Spain

If you fancy yourself as captain of a holiday jet then this latest scenery from O.Pabst will help to complete the illusion. It is one of the most detailed renditions of Palma airport in Majorca that we've seen. Complete with the new impressive terminal buildings, plenty of static aircraft and airport vehicles.
Author: O.Pabst
Download From: www.flightsim.com
Filename: lepa2kb2.zip, lepa2kb1.zip

Flight Unlimited III

Cessna 172 Skyhawk

The second aircraft for FU3 is a Cessna 172 Skyhawk. The 172 was first produced in 1956 and is still in production today. This version provides eight new views, which make a change from the default Cessna. The author apologises for his inferior grade paint program but there are a lot worse around that you would have to pay for. He also suggests that a more suitable panel can be downloaded from www.artisandevelopers.com/web/f3/software/trainer/
Author Tom Wunder
Download From http://www.avsim.com
Filename skyhawk10.zip

Flight Unlimited III

Piper Arrow Design and Cockpit

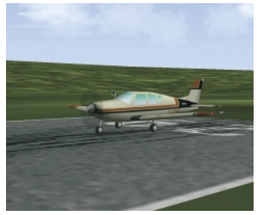
Although Looking Glass' Flight Unlimited III is no longer supported, the fans are still out there designing new aircraft and scenery for it. This is a new Piper Arrow aircraft painted in the Austrian-Post Design. It has a completely redesigned panel with new switches, control lights, enhanced quarter views and autopilot.
Author: Heinz Reiter
Download From: www.flightsim.com
Filename: arrowtft 2.0.zip

X-Plane

727-200 (X-Plane)

The heavy metal cockpits in X-Plane seem to be more realistic than most other flight Sims, with this latest 727-200 proving the point. It has a fully operational flight deck that although hand drawn is very well done. This applies equally to the external views that are provided in four different liveries. The aircraft also includes a pilot's operating handbook in PDF format.
Author: Not known
Download From: www.flightsim.com
Filename: 727f.zip

Beech Bonanza Debonair 1962



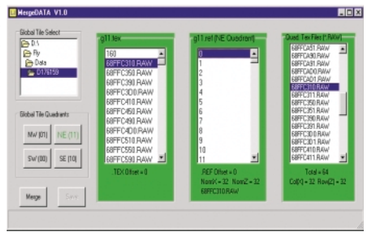
This is a Beech Bonanza Debonair for X-Plane, modelled on the author's own aircraft. Including a custom panel and new external textures. He has tried to make the internal views more realistic by adding a little glare/glass effect to the aircraft instruments, which were digitised from actual pictures.
Author: Geof Applegate
Download From: www.flightsim.com
Filename: b33-deb.zip

Fly!

MD83 Alitalia for FLY!

A new MD83 for Fly! in the Alitalia livery, reworked from an original by Doug Moldenhauer. It includes a new panel using the standard Fly! gauges.
Author: RVi
Download From: www.avsim.com
Filename: amd83.zip

MergeDATA



This is a scenery developer's utility program written for experienced users that attempts to fix the problem when two scenery areas overlap on the same global tile quadrant, resulting in a band of generic tiles separating the two scenery areas. If DisplayDATA (available from www.avsim.com Fly Scenery Developer's library) shows the scenery is unbroken, use of MergeDATA should help.
Author: Larry Jones
Download From: www.avsim.com
Filename: mergedata_v1-0.zip

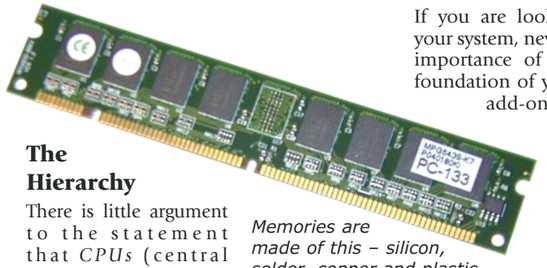
Oh No! It's time you upgraded your PC

Flight simulation fever seems to be spreading across the globe like wildfire, mesmerizing an increasing number of people in every age group. Folks with old, young and middle-aged computers are giving them the frame rate torture test and discovering slowly but surely that an upgrade is looming in the not-too-distant future.

Becoming more common with each issue of PC Pilot, is the huge amount of mail we receive asking questions regarding hardware upgrades. In answer to all your queries, we hope to provide some useful information to those in a quandary about the direction they should take. We all hope to experience flight sim nirvana, but is it actually attainable?

Stay with us, as we have a look at a range of system upgrades, from an MMX processor based PC to a no-holds-barred 1GHz+ screamer. This issue will deal solely with those folks using Intel Pentium II systems, looking for upgrade advice on a limited budget.

Without further ado, let's begin with some basic hardware laws as they relate to the most recent batch of flight simulators.



Memories are made of this – silicon, solder, copper and plastic

The Hierarchy

There is little argument to the statement that *CPUs* (central processing units) rule the kingdom when it comes to raw performance for digital flying. The complex scenery polygons coupled with highly textured aircraft and skies demand the most from the CPU. Clock speed (MHz) and cache (very fast memory) are the two elements that have the most impact on 3D performance. However, selling an aged relative in return for a 1.2GHz chip might leave us with a useless system if the other components are ignored.

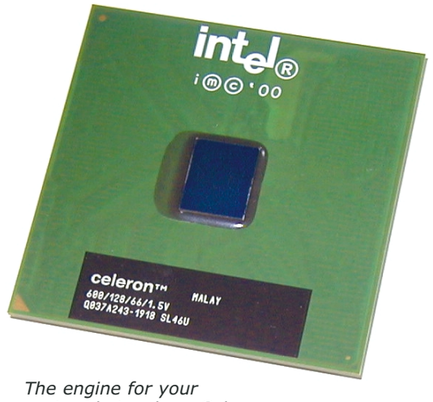
Memory (RAM) is generally considered the next most important piece of your dream machine. For a mid-range system, the primary concern should be the amount (in megabytes) one can afford. While 128Mb will certainly improve load times, view changes (e.g. cockpit front to cockpit left) and smoothness, we recommend 192Mb for optimum performance. In order to keep our system from ageing too fast, it is suggested that PC133 be the memory of choice over PC100 (as in life, there's more than one sort of memory). The costs are nearly the same, while the PC133 allows for an upgrade into the 133MHz-bus speed realm. Like any product on the planet, there is good, better, and best when it comes to RAM. More expensive PC133 SDRAM has faster access times and lower latencies, which can improve all aspects of your PC. Prepare to pay about £1.25 per Mb for the premium sticks, while regular octane memory can be purchased for about 75p per Mb. Take some care when selecting your memory as it can make or break any system. Try and get a lifetime warranty if possible, or at the very least, a three year one.

Third position on the totem pole goes to the *video card*. The newest graphics chips (Voodoo4 & 5, Geforce2 GTS) are capable of boosting frame rates, but they need a fast processor in order to harness all of its ponies. These boards also support full-scene-anti-aliasing (see issue 6 and this one) for improved visual treats in 3D applications.

If you are looking to seriously rebuild your system, never, ever underestimate the importance of a *motherboard*. It is the foundation of your PC's home and every add-on board depends on its strength and stability if they are to deliver their goods.

Hard Drives complete the list, affecting performance only with regards to the loading of programs, as well as the first time a view left/right or externally is selected. After that, the data is residing in memory, making access time much faster the next time that view is selected.

If you are shopping for a hard drive, consider not only the capacity, but also its spindle speed and the UDMA (ultra direct memory access) support it offers. Average speeds these days are 5400rpm with 10,000rpm being the fastest and 7200rpm offering the most value. UDMA transfer rates of 66Mb/sec are now common, while the high end units can run at 100Mb/sec. In order for these to function on your system, you will need both a supporting controller on the motherboard and BIOS support from the motherboard manufacturer. The budget we have set for this month's upgrade would probably not allow for a new hard drive. Still, one or two of you might need more storage for those massive programs.



The engine for your custom hot rod – a Celeron processor

Here is a summary of hardware components most upgrades consist of, listed in order of each one's effect on performance.

(1) **CPU:** most critical in terms of frame rate.

(2) **Memory:** dramatically smoothes the flying experience, can speed up load times and view changes.

(3) **Video Card:** only the latest chips have shown performance increases, but require at least a 500MHz processor.

(4) **Motherboard:** affects performance and system stability. Would be number two (in importance) if changing platforms.

(5) **Hard Drive:** UDMA 33/66 and 100 (Mb/sec) hard drives speed up load times and view changes.

The Upgrade

Our hypothetical system for this issue is a 3-year old 233MHz Pentium II with 32Mb RAM, a 4Mb NVIDIA 128 graphics card and a 4.3Gb 4700rpm hard drive. It's also assumed that we've been using Flight Simulator 98, Flight Unlimited 2, and Combat Flight Simulator with much satisfaction but having just purchased Fly! and Flight Simulator 2000 our flying now resembles a slide show. We instinctively feel somewhat disgruntled at the respective software companies for our stumbling machines. What can we do to rectify this?

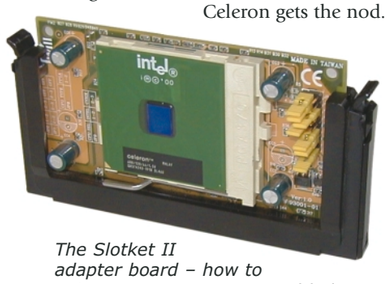
With a little help from here, there and everywhere we scrape together £300, deciding it is time to end the procrastination and install some muscle into our machine.

Some Good News

One of the comforts of owning an Intel platform is the fact there are so many possibilities. Many older Intel based motherboards can support the latest Celerons and Pentium IIIs with a BIOS update. Flashing your mainboard's BIOS is a delicate process. Although not very difficult once understood, if you are not comfortable doing it, we suggest taking it to a reputable computer repair shop. It is worth knowing that a BIOS flash gone astray will completely ruin the motherboard. OK, now that our BIOS settings are updated, we can go shopping for a processor.

Some Bad news

Any 233, 266, 300, or 333MHz Pentium was designed to operate on a 66MHz bus. While Celerons still run at that speed, the Pentium IIIs need a 100MHz or 133MHz system bus in order to extract their full power. That simply means a new motherboard would be required to accompany a Pentium III, if that was our choice. Since that will be out of our budget this time around, it looks like the Celeron gets the nod.



The Slotket II adapter board – how to get a square peg in a round hole

The Celeron is a great option considering its price/performance ratio. For around £75 a 600MHz model can be purchased or better still a 700MHz goes for about £100 (try haggling). It is equipped with 128kb of Level 2 cache, which because of its location (on-chip), runs at the same speed as the CPU core. This fast cache is one of the keys to the Celeron's respectable 3D performance.

A Pentium III will cost from £120 (550MHz) to £250 for an 850MHz. It contains 256kb of L2 cache and thus is the superior performer, albeit at a much greater cost. We opt to purchase the 700MHz Celeron, which leaves us with about £200 in our 'account'. Since Celerons today are manufactured in only 'socket 370 format' (also known as FC-PGA or 'flip- chip pin-grid-array'), it will not fit directly with our older 'slot 1' motherboard. We will need to purchase an adapter board for about £15, which is available in most shops and on-line stores. We have selected the Slotket II from Iwill, which reduces our funds to £185.

Your PC with its lid off – don't worry – just make sure it's not plugged in before you get this far!

Remember…

"Thirty-two Megabytes of RAM does not a smooth flight experience make", so let's go shopping for some memory. We watched some on-line retailers for two weeks and memory walked away with the title of 'most fluctuating prices', so keep that in mind when you actually are about to buy. 64Mb of PC100 (designed to operate at 100MHz bus) varied from £30 to £50, depending on the day. PC133 (for speeds up to 133MHz) varied somewhat less, and surprisingly wasn't that much more, from £50 for 64MB to £80 for 128Mb. Planning ahead like any good pilot, we selected 128mb of PC133 memory. This will ensure top performance from our system and most likely be used on our next upgrade. Now subtract £80 from our funds and we can begin another spree worth £105.

Display

Today's premium graphics cards are priced from £150 to £250, forcing us to look at lower priced options. Both 3dfx and NVIDIA now market lower cost versions of the Voodoo5 5500 and GeForce2. For about £100 we can land a 32MB GeForce2 MX or a Voodoo4 4500. If you are feeling frisky and don't mind going over budget, either one of the faster 64Mb boards will serve you well. In this case, we chose the Voodoo4 4500 because of its fantastic full-scene-anti-aliasing features, which provide us with superb images.

Of course there are other possible scenarios. For instance, one could opt for a Pentium III platform, consuming £200 for a mainboard and CPU. This would mean compromising either the memory or video card purchase if we were to stay close to our budget. The chart below shows the two possibilities.

Final Thoughts

Deciding which upgrade path to take is often difficult and sometimes scary. What one computer finds joy in, another can reject with complete rudeness towards its owner! Nevertheless, if we are true lovers of flight simulation, most of us will do whatever it takes to make our hardware run fluidly. Remember, these are merely two examples of upgrade possibilities that exist, limited only by your imagination and your wallet!

Greg Gott

	CPU	Memory	Video Card	Mainboard	Other	Total Upgrade Cost
Base	233MHz Pentium II	32MB SDRAM	4MB Nvidia 128	Intel LX chip based		
Upgrade 1	700MHz Celeron £100	128MB PC133 £85	Voodoo4 4500 £100	No Change	Iwill Slotket II £15	**£300**
Upgrade 2	600MHz Pentium III £130	128MB PC133 £85	TNT2 or Voodoo3 £65	Pentium III mainboard £65		**£345**

VideoLogic Sonic Fury

Full of sound, fury and an extra something

It's one of life's clichés that the small guy always has to work a lot harder. Creative Labs has dominated the soundboard market, but that means the other names have to come up with an extra incentive for the end user. Rather like the AMD-Intel war in the processor arena.

When we installed the Sonic Fury in our 'small guy' AMD system and didn't have to read the manual to get it working, we were impressed. We downloaded the Windows ME beta driver from the Turtle Beach website, and checked the Readme file. We noted that we were supposed to use the installation program and not the hardware detect wizard. We capitulated, and voila!

The feel of this board is impressive. It looks to have twice as many parts as the Soundblaster 512 PCI it replaced and it is much heavier. It also has more connections than the average home stereo. Technophiles, take note! Just how many connections are we talking about? Twelve. Six appear on the back panel, one of which we need to look at more closely. The other six are internal connections.

Two of the internal connectors are more or less standard on high-end audio hardware: The TAD connector (for audio telephony products), and the CD Audio connector for the analogue audio outputs of CD-ROM or DVD-ROM drives. The third is an additional header for MPC-3, the analogue audio outputs of a second CD-ROM or DVD-ROM drive.

The Sonic Fury is a full-duplex audio board, which means that it can do simultaneous recording and playback at sampling rates up to 48kHz. Onboard are three stereo 18-bit analogue to digital converters for high-resolution recording (four times better resolution than 16 bit converters), and three stereo 20-bit digital to analogue converters for playback of up to six independent streams. The brainpower is supplied by Cirrus Logic's CS4630 (SoundFusion) Digital Signal Processor.

The unusual features of this soundboard revolve around the VersaJack, 6-speaker support, and the 20-bit digital to analogue converters. It is noteworthy that Voyetra, the parent company, makes high-end audio products for the music industry.

The VersaJack can be configured as input, output, digital out, or headphone out. Headphone out can be a problem on some soundboards, since it requires quality output circuits with power supply regulation. The board accomplishes this, and includes Sensaura Virtual Ear™ Technology, said to optimise 3D positional audio for enjoying surround sound with headphones or two-channel stereo setups. Support for other 3D interfaces is present, including A3D 1.0, EAX 1.0/2.0, DirectSound, and DirectSound 3D. Dolby Digital pass through is accomplished via the VersaJack.

TEST SYSTEM

Abit KT-7 RAID
AMD Athlon 800 at 990MHz
194 Mb Hitachi SDRAM 146 MHz
GeForce2 GTS 32MB
Kenwood TrueX 50X CD
Windows ME
Sonic Fury Driver: beta 428wme

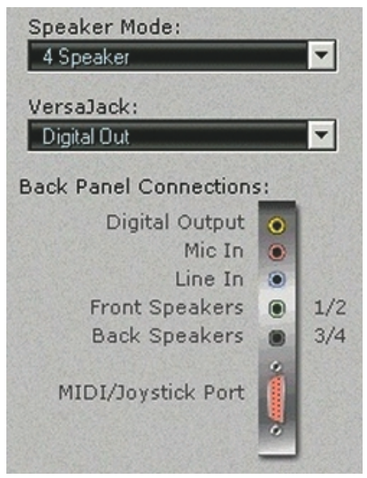
Clean interface eases navigation

The hardware based equaliser has eight presets

After this dazzling display of baffling techno-lingo, we thought we'd focus a bit more on the real life performance in our flight simulators. We did some objective tests and the results confirmed that the Sonic Fury is a great performer, but you don't buy a stereo by reading the specifications, so what does it sound like?

Having spent many hours in Combat Flight Simulator 2 and an early version of B17-II, we decided to compare the sound in these two simulators as well as a couple of music CDs. The comparison was made to the Montego II Quadzilla, the best soundboard in the objective performance tests.

Performance in decoding from the music CDs was not easily distinguishable on a Soundworks FourPoint surround system we were using. Both boards perform exceptionally well, but the bass response seems improved slightly with the Sonic Fury. In fact, the sound in a small office is so good that it is comparable to the much more expensive sound system we use at home. The Sonic Fury control panel comes with a 10 band graphic equaliser, but we found the preset for music worked very well. If you aren't sure about the exact function of a graphic equaliser, it basically replaces treble and bass with about a dozen controls and allows for endless fiddling. They were particularly popular with hi-fi buffs during the seventies, along with high heel boots, flares and the three-day week!



The panel – technophobes need not apply

Torpedo attack on a Japanese cruiser – the sound rattles your fillings

The Sonic Fury comes with a huge software bundle, including AudioView 32, with many more features than Windows' default Sound Recorder. AudioStation 4 makes it easy to organise your music collection. MIDI Orchestrator is also included, along with Sonic Foundry's ACID Xpress (multitrack audio sequencer), Making Waves and more.

We ran B17-II in two instant action missions and in a longer Squadron Commander mission to Brest. Sound quality seems more expansive and the pauses we had noted with some wave files seemed shorter. B17-II with full detail is the most demanding combat simulator we have ever run on any system and the Sonic Fury handled it with consummate ease.

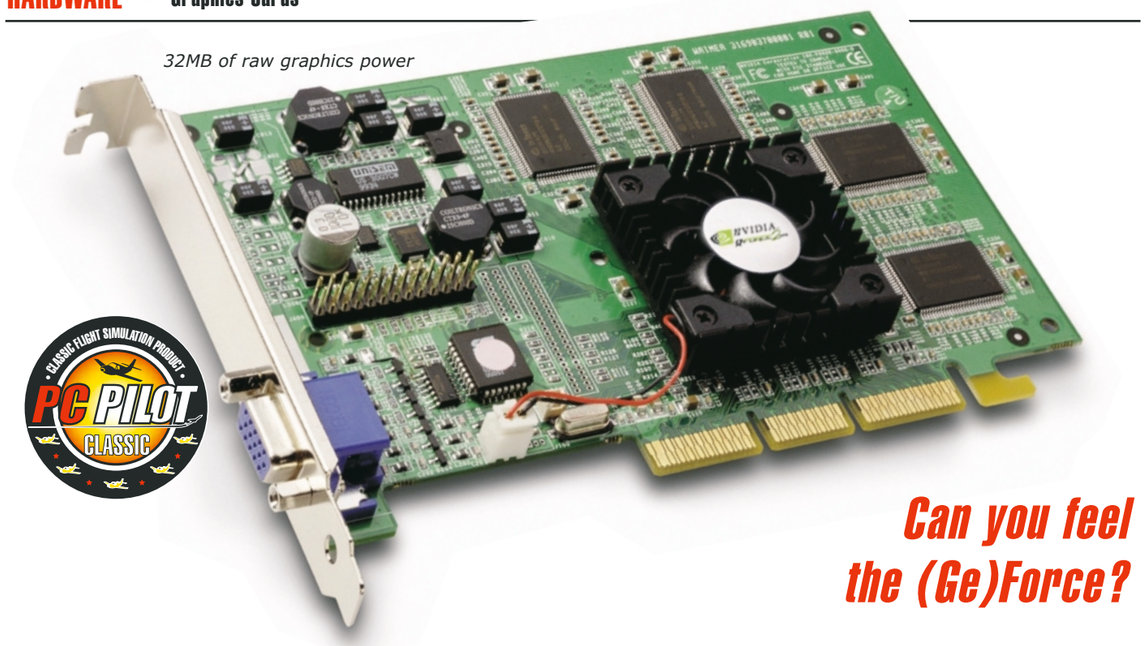
We then tried Combat Flight Simulator 2 with a single anti-ship mission we had created earlier in the week using Roger Dial's modified .air files so that we could try torpedo attacks on Japanese cruisers. Again, sound quality equalled or surpassed that of the Montego II. The explosions have a much cleaner sound, especially at higher volumes.

In summary, this is an all round excellent audio product that should give the Creative line a run for their money. If you've got a good speaker system and a standard card, then this could be a 'sound' upgrade. Don't forget that the Sonic Fury will be released in the US as the Turtle Beach Santa Cruz.

Len Hjalmarson

REVIEW SCORE:			
Developer:	VideoLogic/Turtle Beach	**Price:**	£79.99
Website:	www.videologic.com	**Release Date:**	Out Now

At a glance: A heavyweight sound board that's great for simulators as well as music. Low CPU utilisation, top quality sound reproduction and innovation, along with a solid software package. Windows ME drivers are still beta.



32MB of raw graphics power

Can you feel the (Ge)Force?

NVIDIA GeForce2 GTS

Test System 1

- Abit BE6-2 with 733MHz Celeron 2
- 128Mb SDRAM 94MHz
- TB Montego II
- Windows 98 SE

Test System 2

- Abit KT-7 RAID
- AMD Athlon 800 at 920MHz
- 128Mb SDRAM 133 MHz
- TB Montego II
- Windows ME
- GeForce2 drivers : Detonator 6.31
- Matrox drivers: 6.04.029

You've just fired up Combat Flight Simulator 2 and the Zero is in your sights. You're about to squeeze off a few rounds from the cannon of your Corsair as you dive on his tail, when the frame rate goes south. Alternatively, you're touching down at Frankfurt in a 747 and the ground starts wandering off in a maze of zigzags.

Something in your system wasn't up to scratch and proximity to the terrain with its large textures has sapped your system power.

To cure the problem you stump off to the local computer shop, and purchase… what? A new CPU? A new graphics card? More memory?

A computer system is a complex affair, only as strong as the weakest link. For PC pilots with a PII 400 or better, a new graphics card is a good option. Recently, we moved from the Matrox G400 to the GeForce2 GTS on one of our systems (a Celeron II) and this is our story.

In June we installed NVIDIA's new GeForce2 GTS in place of the Matrox G400. Both boards are stocked with 32Mb of memory and each has features the other lacks, but in the end, the raw horsepower of the GeForce2 has changed our flying forever (well, until something else arrives anyway).

Installation was a cinch. No difficulties whatsoever were encountered with the install, replacing the Matrox with the GeForce2 and rebooting. Some users have had to uninstall the previous video board and reboot with a generic PCI driver first. Documentation is adequate and the GeForce2 ran equally well under Windows 98SE and Windows ME.

At around the same time the new graphics board arrived, we received a copy of Fly!2K and also an early version of Combat Flight Simulator 2. We had heard about the AA (anti-aliasing) features of the GeForce boards, and were anxious to do some serious flight testing, especially as the AA impressed us so much with the Voodoo 5 we tested. Change was in the wind and the barometer was rising.

The initial impressions were memorable. On descending to the runway at Vancouver

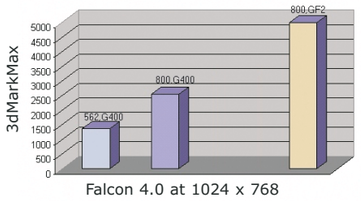


Figure 1

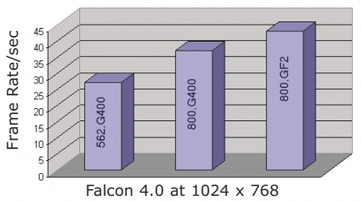


Figure 2

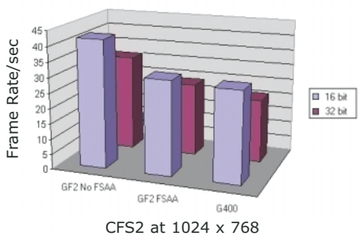


Figure 3

Not Your Father's Computer

Back in the last century, virtual pilots had only one upgrade choice: a new mainboard and CPU. Then along came some new players: Rendition and 3dfx. These graphics concerns followed the lead of high-end video designers for engineering workstations and made the graphics card do some of the geometry work, offloading it from the CPU.

The hardware continued to evolve, until true 3D accelerators began to cost no more than the old video boards. But the workload done by a modern graphics board rivals and even eclipses the work done by modern CPUs. This is good news for flight simmers, but it complicates the upgrade decision. What does one upgrade first?

As a general guideline, if you have a 16MB video board and PII 400 or better, your first upgrade should be a current 32MB board. If you have a 16MB video board and your CPU is less than a PII 400, however, then its time to upgrade your processor. Consider a Celeron II or an AMD Duron if you're on a budget.

Transform your lighting

NVIDIA's introduction of the GPU (graphics processing unit) last year, removed the power hungry burden of tasks of T & L (transform and lighting) from the confines of the CPU. The release of GeForce2 GTS and the second generation of hardware accelerated T&L made real time, high-polygon count scenes possible. In English, this means that complex graphics such as scenery can be displayed more easily, leading to better performance.

Test	Celeron II 800 with Matrox G400-32MB	Celeron II 800 with GeForce2 GTS-32MB
3DMark Result	2,461 3D marks	4,792 3D marks
CPU Speed	154 CPU 3D marks	327 CPU 3D marks
Game 1 - Helicopter - Low Detail	53.1 FPS	88.0 FPS
Game 1 - Helicopter - Medium Detail	35.6 FPS	67.4 FPS
Game 1 - Helicopter - High Detail	14.0 FPS	42.0 FPS
Game 2 - Adventure - Low Detail	48.7 FPS	117.8 FPS
Game 2 - Adventure - Medium Detail	33.3 FPS	52.8 FPS
Game 2 - Adventure - High Detail	20.3 FPS	31.3 FPS
Fill Rate (Single-Texturing)	222.7 MTexels/s	567.4 MTexels/s
Fill Rate (Multi-Texturing)	221.5 MTexels/s	1,167.8 MTexels/s
High Polygon Count (1 Light)	2,383 KTriangles/s	7,346 KTriangles/s
High Polygon Count (4 Lights)	2,050 KTriangles/s	4,562 KTriangles/s
High Polygon Count (8 Lights)	1,738 KTriangles/s	3,857 KTriangles/s
8MB Texture Rendering Speed	188.1 FPS	362.2 FPS
16MB Texture Rendering Speed	183.0 FPS	227.0 FPS
32MB Texture Rendering Speed	138.1 FPS	121.8 FPS

3dMarkMax Comparison of the latest video hardware

International in Roger Dial's beautiful Corsair, the jagged edges were gone! We mailed images to all our friends.

Raw horsepower as well as technological wizardry accounts for the changes. Just how much power does the GeForce2 GTS sport? 25 million polygons per second, according to the manufacturer. However, beauty comes at a price. Frame rate loss with a low anti-aliasing setting (x2) is around 25%. Only powerful systems can afford to sacrifice that much and still preserve reasonable frame rates.

We ran two sets of tests on two computer systems. The first set was on a Celeron II with both the Matrox G400 and the GeForce2 GTS. These tests were in actual flights, in some cases using a third party frame rate counter (FRAPS).

The second set of tests was run using 3dMarkMax 2000. 3DMarkMax 2000 is used by a host of magazines and web sites worldwide for evaluating 3D performance. 3dMarkMax 2000 provides a synthetic benchmark that uses actual software output to determine results, enabling the user to tweak their system for maximum performance. 3dMarkMax 2000 is a comprehensive suite, as shown in the image. If you want to find out more, www.madonion.com is worth a visit.

Figures 1 and 2. These two charts show the results of testing with some older flight simulators. The actual frame rate increase in Falcon 4.0 moving from the G400 to the GeForce 2 was only 6 frames per second. Falcon 4.0, however, was written for DirectX 6 and does not take advantage of the onboard GPU of the GeForce2, which does much of the graphics rendering. Combat Flight Simulator 2 shows a different story.

Figure 3. Here you can see not only the difference that hardware T&L (Transform and Lighting) makes, you also see the power of the GeForce2. Note also the 25% reduction in frame rate when full screen anti-aliasing is engaged.

Some would argue that it's unfair to compare the GeForce2 with the Matrox G400 and that the real comparison is with the 3dfx V5000 series. While the GF2 and 3dfx boards are comparable in price, the performance difference is substantial. 3dMarkMax generates a score of 6400 for the GF2 on an Athlon at 920MHz, but only 3930 for the Voodoo 5. The 3dMarkMax scores varied between 50 to 110% better for the GF2. With these differences, the 3dfx boards suddenly appear expensive.

Worth upgrading?

If the budget is stressed, it makes more sense to purchase NVIDIA's budget solution, the GeForce2 MX series. These boards are still more powerful than the 3dfx hardware, but cost much less. In addition, the GF2 series sports a HDVP processor (high definition video processor). All you need is an HDTV tuner card and your monitor becomes a High Definition TV.

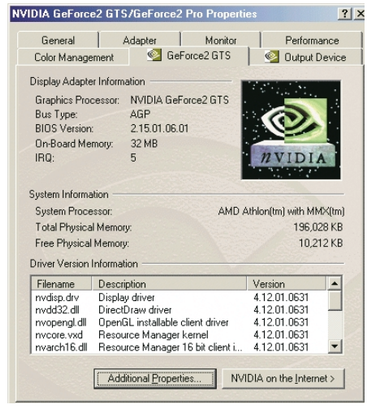
If you are in need of all the horsepower you can handle, the GeForce2 Ultra is for you. Like the MX, these 64MB boards are built on the new .18 micron silicon with enhanced cooling, allowing higher clock speeds. The additional memory allows FSAA at higher resolutions or greater colour depth. The additional power can be directed to higher resolutions or to improved anti-aliasing (the x3 or x4 setting).

Whichever solution works for you, once you see anti-aliasing on your favourite aircraft, you'll never go back. With the GeForce series, graphics hardware truly comes of age. Us flight simmers want more than improved performance, we want more features and improved images. For the moment, NVIDIA delivers. ■

Len Hjalmarson

Corsair in Flight Simulator 2000, no anti-aliasing

Corsair in Flight Simulator 2000 with anti-aliasing - look at the runway markings



The Properties Tab for GF2 in Windows ME

REVIEW SCORE:

Manufacturer:	NVIDIA	**Price:**	£205
Website:			www.nvidia.com

At a glance: Fantastic performance, a powerful feature set and frequent driver revisions combine to make the GeForce series the current reigning graphics champion at this weight.

Product Listings

Our comprehensive round up showing our favourites from the many products we've evaluated over the months. Please note that the prices indicated are the RRP at original time of release. Be sure to check for bargains at your favourite sim emporium as there are always bargains to be found!

CIVIL SIMS

Elite 6.0

Undoubtedly the best IFR procedural trainer there is. So it should be, the frightening price will put off all but the truly serious - the full kit can cost £695.

Initiative Computing £249.95 — **www.flyelite.com** — **Featured:** Issue 4

Flight Simulator 2000

Despite much publicised criticism over poor frame rates and misleading PC requirements, this still seems to be the benchmark sim. An awful lot of sim for the money, but invest in a decent PC before buying.

Microsoft £49.99/£69.99 — **www.microsoft.com** — **Featured:** Issue 2

X-Plane

Not for beginners or casual flyers, but definitely the 'thinking man's flight sim' - it's even compatible with a Mac, you can fly on Mars (among other places) and we loved the flight model. It also gets regular updates so Internet access is a must.

Laminar Research £75.00 (approx) inc. postage — **www.x-plane.com** — **Featured:** Issue 6

Precision Simulator 744

A no-compromise and no-frills approach to flying a Jumbo Jet. No pretty scenery or advanced terrain but probably as close as you'll ever get to the real thing without a trip to a full motion airline simulator.

Aerowinx £159.99 — **www.aerowinx.com** — **Featured:** Issue 6

Airline Simulator 2

Perhaps the best airline flight modelling around with accurate procedures (it's been designed by real airline pilots over many years). Unfortunately not for the faint of heart - old DOS interface and daunting controls a real put-off. Expensive too.

Just Flight £99.99 — **www.justflight.com** — **Featured:** Issue 1

Airport Inc.

Take a rest from flying and show BAA how they should really run Heathrow. Fun, yet ultimately limited airport management game.

Take 2 £29.99 — **www.take2games.com** — **Featured:** Issue 4

FlitePro

Offers a wide range of training features for the IFR pilot, yet reasonably affordable. Low frame rate for instruments detracts from its overall appeal.

Jeppesen £99.99 — **www.flitepro.com** — **Featured:** Issue 4

Fly!

Overshadowed by Microsoft's mighty sim, Fly! has gathered a loyal following. Thought to be better than its rival and some excellent add-ons (and patches) enhance the appeal from when we originally rated it. Available at less than £10 in some stores so a true bargain!

Take 2 £39.99 — **www.iflytri.com** — **Featured:** Issue 1

COMBAT

Enemy Engaged: Comanche vs. Hokum

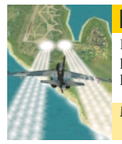
Strikes the balance between gameplay and realism perfectly. Ideal for both rocket junkies or rotorcraft rookies alike. Only downside is no single mission mode and it's not as pretty as Gunship.

Empire £29.99 — **www.enemyengaged.com** — **Featured:** Issue 5

Tuskegee Fighters

Beautifully designed aircraft and excellent scenery. The great missions add the final touch of genius. One for any CFS fan's must-buy list!

Abacus £29.99 — **www.abacuspub.com** — **Requirements:** CFS — **Featured:** Issue 5



Flanker 2.0

Excellent, with great detail. This is one of the few combat packages that is worth calling a simulation. Online fan base will prolong longevity and interest.

Mindscape £34.99 — **www.ssionline.com** — **Featured:** Issue 2

Janes F/A 18

Technically complex with masses of detail and lots of options. Mission builder is nice. Downside is that it is technically complex and you need a high-spec PC.

Electronic Arts £39.99 — **www.janes.ea.com** — **Featured:** Issue 5

Janes USAF

Massive potential with formidable collection of aircraft simulated. Pretty graphics and pretty well done, though lacks details purists might seek.

Electronic Arts £39.99 — **www.janes.ea.com** — **Featured:** Issue 3

Pacific Combat Pilot

Great aircraft with nice details, picturesque scenery and challenging missions. Blocky aircraft textures and strange German voices on the radio are its only drawbacks.

Just Flight £24.99 — **www.justflight.com** — **Requirements:** CFS — **Featured:** Issue 3

Fighter Ace II

If you've got a fast Internet link and you fancy some live (for the moment) opposition, then this is as good an introduction as any to combat on the web. Excellent graphics and a reasonable cost means that, as usual, Microsoft will have a winner.

Microsoft £6.50 per month — **www.zone.com/fighterace** — **Requirements:** Internet link/modem — **Featured:** Issue 7

Air Power - The Cold War

Nato vs The Warsaw Pact - relive the days when "njet!" meant "get in the bunker, the reds are coming!" Now with CFS missions and campaigns this has evolved into an excellent add-on.

Just Flight £24.99 — **www.justflight.com** — **Requirements:** FS98/2000 & CFS — **Featured:** Issue 7

F/A 18 Super Hornet

Unsurpassed carrier operations and silky smooth flight model appeal. Unfortunately only forty missions and the basic scenery detract.

Titus £34.99 — **www.superhornet.com** — **Featured:** Issue 3

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SCENERY AND AIRCRAFT

FS Traffic

Perhaps the best £20 you can spend enhancing Flight Simulator - it really does bring airports to life. Now in boxed and download flavours.

Just Flight £19.99 — **www.justflight.com** — **Requirements:** FS98/2000 — **Featured:** Issue 2

Luftwaffe Collection

Oozes authenticity and packed with an ecletic, yet perfectly detailed, collection of aircraft. Some CFS niggles (such as no Quick Combat set-up for the aircraft) only downside. We gave it away free on Issue 6!

Just Flight £24.99 — **www.justflight.com** — **Requirements:** FS98/2000 or CFS — **Featured:** Issue 1

Airport 2000 Volume 2

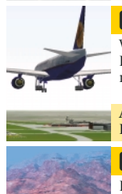
Incredibly detailed renditions of major airports with decent aircraft and adventures. Sadly a frame-rate hog in both FS98 and 2000 and adventures are complex.

Just Flight £29.99 — **www.justflight.com** — **Requirements:** FS98/2000 — **Featured:** Issue 4

FS Clouds

Fantastic effects with a minimal frame-rate hit and apart from a few graphic glitches it is a worthwhile improvement on Microsoft's own fluffy stuff.

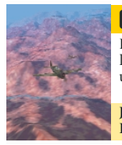
Just Flight £24.99 — **www.justflight.com** — **Requirements:** FS2000 — **Featured:** Issue 6



German Airports 3

Wonderful enhancement for those interested in flying to the Fatherland. Like all beautiful things though, can drain system resources alarmingly.

Aerosoft £24.99 — **www.aerosoft.com** — **Requirements:** FS98/2000 — **Featured:** Issue 4



Grand Canyon

Breathtaking graphics from the developers of Airport 2000, with lots of new aircraft and adventures. Fun to explore, but ultimately limited area and poor frame rates.

Just Flight £24.99 — **www.justflight.com** — **Requirements:** FS98/2000 or CFS — **Featured:** Issue 1

Mad Dog 2000

Now updated and running in FS2000, a very competent add-on that makes FS2000 feel like a different simulator. Not cheap, but it's much more than just one aircraft.

Lago £34.99 — **www.lagoonline.com** — **Requirements:** FS98/2000 — **Featured:** Issue 7

Private Wings

A quality collection that all virtual pilots interested in light aviation should consider. Only downside is some aircraft do not feature transparent canopies.

Data Becker £19.99 — **www.databecker.com** — **Requirements:** FS98/2000 — **Featured:** Issue 5

Royal Air Force 2000

Ecletic, yet balanced, mix of aircraft with excellent panels and bonus of missions for CFS users. A few clumsy details on some of the aircraft are the only downers.

Just Flight £24.99 — **www.justflight.com** — **Requirements:** FS98/2000 or CFS — **Featured:** Issue 4

737 for Fly!

A meticulous re-creation of the 737-500 for Fly! Superb detailing is only let down by blurry external textures.

Wilco £18.95 — **www.wilcopub.com** — **Requirements:** Fly! & Fly!2K — **Featured:** Issue 6

HARDWARE

AFCS II Yoke

Heavy metal control, hand crafted and definitely the Aston Martin of controllers. Eye-watering price to match though.

AETI £400.00 — **www.simpilot.com** — **Featured:** Issue 3

AMD Athlon 550 MHz Processor

If you are thinking of upgrading your processor, then the Athlon is the one we'd choose for the best flight sim set-up.

AMD approx £100.00 — **www.amd.com** — **Featured:** Issue 5

Go Flight GF45

A very useful item - no fuss USB unit that takes the place of on-screen avionics display and keyboard controls - buy five for a full radio stack!

Go Flight £79.95 — **www.goflightinc.com** — **Featured:** Issue 7

Voodoo 5 5500

The latest offering from 3dfx, complete with FSAA, that now works in FS2000 as well. Better frame rates and smoother lines, but only those with long pockets need apply.

3dfx £249.00 — **www.3dfx.com** — **Featured:** Issue 6

G400 Dual-Head

One of our favourite cards. 32Mb with nice twin monitor support. Fast, smooth and great value.

Matrox £150.00 — **www.matrox.com** — **Featured:** Issue 4

OTHER PROGRAMS

SimCharts

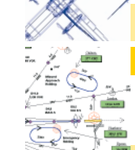
Genuine Jeppesen airport charts (to all intents and purposes) at a bargain price. But they're on the CD and you need a decent printer. Treat yourself to the expensive pack and get printed en-route charts too.

Jeppesen £19.99/£29.99 — **www.jeppesenpcpilot.com** — **Featured:** Issue 2

Aircraft Animator

Easy to use and delivers excellent results quickly. Only if you are a keen fiddler should you really splash out as most aircraft come ready-animated now.

Abacus £34.95 — **www.abacuspub.com** — **Requirements:** FS98/2000 or CFS — **Featured:** Issue 2



Final Approach

Good value package that not only solves the mystery of IFR approaches, but also provides fistfulls of airport plates too. Not for the casual flyer though.

Just Flight £24.99 — **www.justflight.com** — **Featured:** Issue 5

FS Design Studio Pro

A great package for designing scenery and aircraft. While relatively easy to use it can be tricky to place scenery accurately when you've finished being creative.

Abacus £39.99/£59.99 — **www.abacuspub.com** — **Requirements:** FS2000 — **Featured:** Issue 5

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Features: Behind Enemy Lines with B17 II, Police Air Support Unit, Opened The Box

Hardware: Sticks

Tutorials: London City to Stansted – VFR & IFR

Issue 3

Reviews: F/A 18 Super Hornet, Jane's USAF, Austria Professional, Pacific Combat Pilot, Wings Over china, FS2000 books

Features: The Low Down (charts), Building Fear and Loathing Over The Crimea (Flanker 2.0), Southampton's Super Sim, Downloads

Hardware: Yokes, Pedals, Throttles

Tutorials: Stansted to Birmingham – VFR & IFR

Issue 4

Reviews: Airport 2000 V2, RAF2000, Elite, FlitePro, 3 Great Planes, German Airports 3 (FS2000), Airport Inc., Air Power – Cold War

Features: Advanced Flying, Multiple Monitors, Virtual Airlines, Downloads

Hardware: Graphics Cards

Tutorials: Birmingham to Dublin – VFR & IFR

Issue 5

Reviews: Enemy Engaged (Comanche Hokum), Gunship!, Janes F/A 18, VIP Classic Airliners 2000, Private Wings, Final Approach, FS Design Studio, Tuskegee Fighters, Behind Enemy Lines, Game Commander, Pilot's Information Manual

Features: Under the Cowling (engines), Airport Design, SAITCO/IVPA

Hardware: Processors

Tutorials: Dublin to Glasgow – VFR & IFR

Issue 6

Reviews: X-Plane, 747-200, PS1, Radar Contact, VFR Scenery, Glideslope Scenery, Legendary Aircraft, FS Clouds, Private Pilot, 737 for Fly!, 757 for Fly!

Features: Defence Helicopter Flying School, Low Down on Downloads, Control Surfaces

Hardware: Voodoo 5, Speaker multi test

Tutorials: Glasgow to Manchester VFR and IFR

Issue 7

Reviews: : Airbus 2000 SE, Air Power – The Cold War, Aces High, Fighter Ace II, FS Commander, DreamFleet Cssna Panel, Phoenix 777, Phoenix Bonanza, Mad Dog 2000

Features: Cockpit Building, Multi Monitors, Flight Planning, Aircraft Building in Flight Simulator

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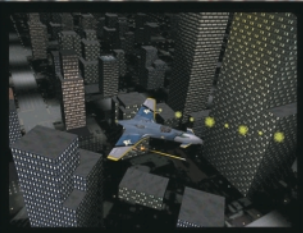

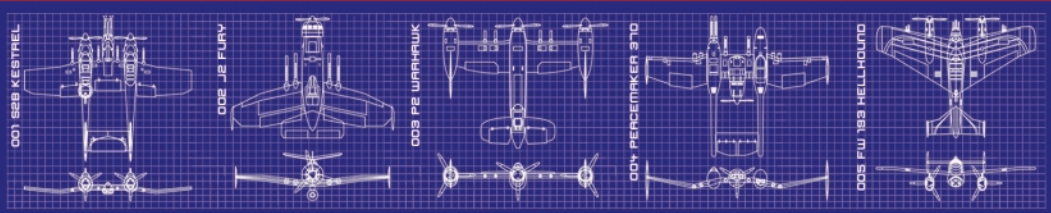

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